

FIFTY-THIRD
ANNUAL REPORT
OF THE
FISHERIES BRANCH

Department of the Naval Service

FOR THE YEAR

1919

PRINTED BY ORDER OF PARLIAMENT



OTTAWA
THOMAS MULVEY
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1920

FIFTY-THIRD
ANNUAL REPORT
OF THE
FISHERIES BRANCH

Department of the Naval Service

FOR THE YEAR

1919

PRINTED BY ORDER OF PARLIAMENT



OTTAWA
THOMAS MULLEN
PRINTED TO THE KING'S MOST EXCELLENT MAJESTY
1920

*To His Excellency the Duke of Devonshire, K.G., P.C., G.C.M.G., G.C.V.O., etc.,
etc., Governor General and Commander in Chief of the Dominion of Canada.*

MAY IT PLEASE YOUR EXCELLENCY:

I have the honour to submit herewith, for the information of Your Excellency and the Parliament of Canada, the fifty-third annual report of the Fisheries Branch of the Department of the Naval Service.

I have the honour to be,

Your Excellency's most obedient servant,

C. C. BALLANTYNE,

Minister of the Naval Service.

DEPARTMENT OF THE NAVAL SERVICE,

OTTAWA, June, 1920.

To His Excellency the Duke of Devonshire, K.C., P.C., G.C.M.G., G.C.V.O., etc.,
Governor General and Commander in Chief of the Dominion of Canada

MAY IT PLEASE YOUR EXCELLENCY:

I have the honour to submit herewith for the information of Your Excellency and the Parliament of Canada, the fifty-third annual report of the Fisheries Branch of the Department of the Naval Service.

I have the honour to be,

Your Excellency's most obedient servant,

G. C. BALLANTYNE,

Minister of the Naval Service.

DEPARTMENT OF THE NAVAL SERVICE,

OTTAWA, June, 1920.

CONTENTS.

DEPUTY MINISTER'S REPORT covering—

	PAGE
International Questions.....	7
Fisheries Commission.....	7
Pelagic Sealing Treaty.....	8
Departmental Activities.....	8
Educational Campaign in Lobster Conservation.....	9
Control and Protection of Fisheries.....	10
Fisheries Patrol Service.....	10
Publicity and Transportation Division.....	11
Investigations at Biological Stations.....	11
Natural History Investigations.....	15
Fish Culture.....	15
Oyster Culture.....	17
Fish Inspection.....	17
Cannery Inspection.....	19
Drift-net Fishing Operations.....	19
Bait Reporting Service.....	19
Fisheries Statistics.....	20
Fishing Bounties.....	20
Proposed New Activities:—	
Proposed Scientific Division.....	22
Proposed Technical Education.....	22
Reorganization of the Outside Service.....	23
Review of the Fisheries of 1919.....	25
Atlantic Fisheries.....	25
Inland Fisheries.....	27
Pacific Fisheries.....	27

APPENDICES.

1. Reports of Inspectors of Fisheries.....	30
2. Natural History Report.....	52
3. Entries in Canadian Ports by United States Fishing Vessels.....	58
4. Fisheries Expenditure and Revenue.....	64
5. Prosecutions, Confiscations and Sales.....	65

CONTENTS

Deputy Minister's Report covering

7	International Questions.....
7	Fisheries Commission.....
8	Pelagic Sealing Treaty.....
8	Departmental Activities.....
9	Educational Campaign in Lobster Conservation.....
10	Control and Protection of Fisheries.....
10	Fisheries Patrol Service.....
11	Publicity and Transportation Division.....
11	Investigations at Biological Stations.....
16	Natural History Investigations.....
16	Fish Culture.....
17	Oyster Culture.....
17	Fish Inspection.....
18	Cannery Inspection.....
19	Brill-net Fishing Operations.....
19	Bait Reporting Service.....
20	Fisheries Statistics.....
20	Fishing Bounties.....
	Proposed New Activities:—
22	Proposed Scientific Division.....
22	Proposed Technical Education.....
23	Reorganisation of the Outside Service.....
25	Review of the Fisheries of 1919.....
25	Atlantic Fisheries.....
27	Inland Fisheries.....
27	Pacific Fisheries.....

APPENDICES

30	1. Reports of Inspectors of Fisheries.....
32	2. Natural History Report.....
38	3. Entries in Canadian Ports by United States Fishing Vessels.....
61	4. Fisheries Expenditure and Revenue.....
62	5. Prosecutions, Confessions and Sales.....

DEPUTY MINISTER'S REPORT.

To the Hon. C. C. BALLANTYNE,
Minister of the Naval Service.

SIR,—I have the honour to submit the fifty-third annual report of the Fisheries Branch of the Department of the Naval Service, which deals with:—

- (a) International questions;
- (b) The various activities of the branch;
- (c) Proposed new activities;
- (d) Reorganization of the Outside Service;
- (e) The fishing operations of the year 1919.

Appendices to this report include the following:—

- 1. Reports of Inspectors of Fisheries.
- 2. Natural History Report.
- 3. Entries in Canadian Ports by United States Fishing Vessels.
- 4. Fisheries Expenditure and Revenue.
- 5. Summary of Prosecutions, Confiscations and Sales.

INTERNATIONAL QUESTIONS.

While the oceans are commercially regarded as the great dividers of nations, from a fisheries standpoint they form the meeting grounds of the nations of the world. Hence from the earliest time, the fisheries have been a fruitful source of international problems, and in all probability, they always will be so.

FISHERIES COMMISSION.

The work of the International Fisheries Commission, which was appointed in 1918 to consider a settlement of outstanding fishery questions between Canada and the United States, was explained in my report of last year. Substantial progress has been made following consideration of the report of the commission by the two Governments. On the 2nd of September last a treaty was signed at Washington for the joint protection, preservation and propagation of the sockeye salmon fishery of the Fraser River system. When this treaty was under consideration by the United States Senate with a view to ratification, it was discovered that under the wording of the final sentence of article 2 thereof, a person who had been tried and acquitted for an offence against the regulations in one country, if he subsequently went to the other, could again be tried for the same offence. As such a possibility is seriously objectionable, it was decided by the President of the United States to withdraw the treaty from the Senate for re-negotiation of this article. The amending article has been practically agreed upon and it is anticipated that the treaty will be ratified during the coming year.

Negotiations have also been proceeding towards the settlement of a number of questions regarding privileges, etc., of the fishing vessels of one country when visiting the ports of the other. These are matters which have been the cause of friction between the two countries ever since there was a United States. It will be remembered that they were temporarily settled by authority of an order of the United States Secretary of Commerce, issued by authority of the President, on the 21st of February, 1918, so far as the United States are concerned, and by an Order in Council of the 8th of March of that year, so far as Canada is concerned. The provisions of these arrangements are being maintained pending the outcome of the negotiations for a more permanent arrangement.

11 GEORGE V, A. 1920

PELAGIC SEALING TREATY.

The Pelagic Sealing Treaty, which was signed on July 7, 1911, is demonstrating its efficiency from all standpoints. Following the ratification of the treaty, all commercial killing was prohibited on the United States and Russian islands for a period of five years, so that commercial killing, which was carried on to a small extent in 1912 before the close season became effective, did not again begin on the United States islands till the latter part of the season of 1917, and on the Russian islands until the season of that year. Under the treaty, Canada received from the United States an advanced payment of \$200,000 and \$10,000 a year for five years covered by the close season. These advanced payments have, however, to be recouped by the retention of a sufficient share of the skins that would otherwise come to Canada. Canada receives 15 per cent of the skins taken on the United States and Russian islands and 10 per cent of the skins taken on the Japanese islands. The total number of skins taken on the different islands for commercial purposes has been as follows:—

Year.	United States Islands.	Russian Islands.	Japanese Islands.
1912.....	3,764	nil.	139
1913.....	nil.	"	547
1914.....	"	"	537
1915.....	"	"	571
1916.....	"	"	nil.
1917.....	1,831	806	"
1918.....	34,890	no record.	550
1919.....	27,821	636	555

An accounting has not yet been completed with the United States, but keeping in view the prices at which the seal skins sold up to and including the sale of February last, and on the assumption that similar prices will be obtained for the skins that are still on hand, Canada will receive, for her share of the skins taken up to the end of 1919, after recouping the United States for the advanced payments, well over \$800,000 from that country, in addition to over \$30,000, for the unsold skins received from the Russian and Japanese islands.

DEPARTMENTAL ACTIVITIES.

The year 1919-20 has been a busy one in the life of the Fisheries Branch, and has also been one of great importance; as measures—consideration of which had to remain in abeyance during the war—were effected, which clear the way for further action towards the encouragement of proper and speedy development of our fisheries.

The activities of the branch during the year, in the direction of the conservation, propagation, and increased commercial development of our fishery resources, and the maintenance of a high standard of quality in Canadian fish products, comprised the following:—

- Educational campaign among lobster fishermen and packers.
- Control and protection of fisheries,
- Fisheries patrol service,
- Publicity and Transportation Division,
- Investigations at biological stations,
- Natural history investigations,
- Fish culture,
- Oyster culture,

SESSIONAL PAPER No. 40

Fish inspection,
Inspection of canneries and canned fish,
Drift-net fishing operations,
Bait-reporting service,
Fisheries statistics,
Fishing bounties.

EDUCATIONAL CAMPAIGN AMONGST LOBSTER FISHERMEN AND PACKERS.

This work was begun in 1918 and proved so useful that it was resumed this year. The campaign was under the personal direction of Doctor A. P. Knight, of Queen's University, who has been, for some years past, engaging in investigations into the natural history of the lobster. Doctor Knight organized the campaign for the season of 1919, but shortly before the work began he became ill, and unfortunately was unable to take further active part in it.

The campaign was carried on mainly during the spring lobster fishing seasons. Those engaging in it and the districts in which they were working were:—

1. Mr. Andrew Halkett, Naturalist of the department—Southern New Brunswick and a portion of the southern coast of Nova Scotia.
2. Rev. Doctor Macgillvary, of Kingston—Western Nova Scotia.
3. Professor C. J. Connolly, of St. Francis Xavier University—Cape Breton island.
4. Professor W. T. MacClement, of Queen's University—Northern Nova Scotia and eastern Prince Edward Island.
5. Professor H. G. Perry, of Acadia University—Queens and Prince counties, Prince Edward Island.
6. Rev. Professor Vachon, Laval University—Eastern and northern New Brunswick.

The results of this work are most encouraging. The different lecturers never failed to adapt themselves unhesitatingly to the local conditions. Hence, the work was not carried out according to any fixed method. Cannery managers, foremen, cannery helpers, fishermen and others interested were called together in halls, schools, etc., when addresses were given and discussions invited. Also groups were addressed in the canneries, on the wharves, etc., as opportunity might offer and in different instances, access to the churches was sought, when the guiding thought of the proper use of the natural gifts of the Creator was impressed.

The direct information given the fishermen and others interested has resulted in a much more general knowledge of the natural history of the lobster, and the need for its protection. As a consequence, the liberation, by the fishermen, of all egg-bearing lobsters found in their traps, is obviously becoming more general. The fishermen are discussing the natural history of the lobster, and the desirability, in their own interests, of affording it proper protection, to an extent they were not doing before, and such discussions are sure to be helpful. It also seems evident that the need for co-operation by the fishermen and canners with the department in protecting the industry is more generally realized.

This campaign was followed up during the winter, when the fishermen have more time at their disposal, by a series of addresses by Mr. Halkett. These addresses were illustrated with lantern slides, and as a general thing they aroused keen interest. Mr. Halkett's time was entirely taken up during the winter in western Nova Scotia, but it is the intention that he will resume such work on other portions of the coast during the winter of next year.

11 GEORGE V, A. 1920

CONTROL AND PROTECTION OF FISHERIES.

The important work of the year in this connection is dealt with below under the heading, "Reorganization of the Outside Service." It is therefore considered unnecessary to make any remarks at this point.

FISHERIES PATROL SERVICE.

The work of fishery officers on both the Atlantic and Pacific coasts in enforcing close seasons and other fisheries regulations, and in preventing illegal fishing, is supplemented by that of motor-boats and small steamers which patrol stretches of the coast where it might otherwise be difficult for the officers to put an effective stop to violations of the law.

Three boats, the *A*, the *B*, and the *F*, patrolled the waters of Nova Scotia from Lunenburg county westward while two boats, (the *C* and the *E*) were on patrol duty along the shores of Halifax and Guysborough counties and the Northumberland strait shore of the province. Some seizures of illegally set lobster gear were made, but on the whole the regulations were well observed.

Prince Edward Island waters were patrolled by the *D*, the *J. L. Nelson* and the *Richmond*, throughout the summer, and by the *Ostrea* and the *33* for a brief period in the fall. A determined attempt at fishing lobsters in close season was so successfully suppressed by the vigilance of the patrol-boat captains and crews that the *Ostrea* and the *33* found nothing to accomplish during their period of patrol.

In patrolling New Brunswick waters, four boats were employed in the Bay of Fundy, one in the Northumberland strait, and one at Miscou and Shippegan islands. Owing to the energetic efforts of the special patrol officer employed at Whitehead, Grand Manan, where it has been a common practice to dynamite pollock, no attempts were made to use dynamite last year. The *Phalarope*, the *G*, and the *Sea-Gull* did good work in destroying lobster traps; and it is noteworthy that violations of the lobster fishing regulations are becoming fewer each year. In the Northumberland strait, the *Hudson* was on salmon patrol duty for a time at Miramichi bay, and later did good work on lobster patrol and nipped in the bud the attempts at illegal fishing. At Shippegan and Miscou islands, formerly notorious for lobster poaching, the illegal fishing has been broken up, due largely to the good work of the *En Avant*.

The steamer *Loos* is used by the inspector of fisheries for the province of Quebec, in patrolling the waters of the gulf of St. Lawrence, and in visiting the widely separated points on the north shore, which would otherwise be almost inaccessible. At the Magdalen islands, a hired motor-boat, the *Waldren W*, was employed on lobster patrol duty.

The steamer *Bradbury* patrolled lake Winnipeg, and assisted in collecting whitefish and pickerel spawn for the fish hatcheries.

The following regular patrol-boats were on patrol duty on the Pacific coast during the year:

Southern District (comprising the Fraser river, Howe sound, and part of the gulf of Georgia):—*Merrysea*, *Swan*, *Foam*, *Elk*, and *Semiahmo*.

Northern District:—*S.S. Crosby*, *Hawk*, *Kayex*, *Merlin*, *Linnet*, *Bonila Gannet*, *Kingfisher*, *Babine No. 1* and *Babine No. 2*.

Vancouver Island District:—*Cohoe*, *Gull*, *Black Raven*, *Heron*, *Egret*, *Alcedo*, and *Fispa*.

Besides the regular patrol-boats mentioned, twelve chartered launches were employed for periods ranging from two to six months in the Northern District; and two chartered launches and one confiscated launch, in controlling the operations of Indians in the Southern District.

Several seizures were made, and the illegal operations carried on by Skeena river and Rivers inlet fishermen were greatly curtailed.

SESSIONAL PAPER No. 40

PUBLICITY AND TRANSPORTATION DIVISION.

In 1907 the department realized that if a demand for fish was to be built up in this country and the fresh fish industry developed accordingly, transportation facilities for fish had to be greatly improved and comparatively cheap rates made available. What the department did in such directions has been fully explained in previous reports, and need not therefore be repeated here. Suffice it to say that investigation left little room for doubt that the industry had attained such proportions that it could henceforth take care of itself so far as transportation charges are concerned. Hence, in August last, after due notice to those interested had been given, all such assistance was withdrawn as it was considered that from then on more effective work towards expanding the demand for fish generally could be done in other directions. This does not mean that the department will, in future, cease to give attention to more and more adequate transportation facilities being provided. On the contrary, close direct effort will be continued along such lines.

To enable the department to best serve the industry, a new division known as the "Publicity and Transportation Division" was added during the past year. An officer to take charge of this division was not secured until late on in the year, so that actual organization thereof did not begin until the 15th December last. Much has already been done through this division in the way of interesting the press of the country in giving attention to the great asset it has in its fisheries by affording space to articles containing interesting information about the fisheries and otherwise. Efforts are being made through this division to have the schools of the country give greater attention to our fisheries, and a contest has already been instituted among the pupils of domestic science schools—the future housewives—throughout the Dominion, in the use of fish. Prizes are being offered for the best original recipes. Also, an essay writing contest among the pupils of the schools generally is being organized with the object of arousing deeper interest in the industry.

When the organization of this division is completed and the situation sufficiently studied, it is felt that it will be able to do a great deal towards increasing the demand for fish not only in this country, but throughout the fish importing countries of the world. It already has taken over the work that was undertaken by the Canadian Trade Commission and it will co-operate closely with the Intelligence Branch of the Department of Trade and Commerce.

By co-operation with the publishers of the *Canadian Fisherman*—the organ of the Canadian Fisheries Association—and the Canadian Trade Commission, this department arranged for the issue of three special editions of the *Canadian Fisherman* to be placed in the hands of importers of fish in the different parts of the world. These editions were published in English, French and Spanish, in parallel columns, as one or the other of these languages can be read in practically every fish-importing country. Each of these editions was carefully prepared and reflects much credit on the editor of the paper. They were quite fully descriptive, both by printed matter and illustrations, of our Canadian fisheries, and contained lists of addresses of our fish producers with invitations to importers to get into direct communication with them.

WORK OF THE BIOLOGICAL STATIONS.

The past season, 1919, has been the most successful one on record, as as there have been larger staffs of scientific workers carrying on investigations at both stations, and the work is now carried on all the year round and not merely during the summer months, as formerly.

11 GEORGE V, A. 1920

St. Andrews Biological Station.

The scientific staff in 1919 numbered in all twenty-one. There were:—

Professor Knight, Kingston, Ont.

“ Bailey, Fredericton, N.B.

“ Cox, Fredericton, N.B.

“ Connolly, Antigonish, N.S.

“ J. W. Mavor, Union College, Schenectady, N.Y.

“ Vachon, Laval University, Montreal.

Doctor Slater Jackson, McGill University, Montreal.

Miss Shanly, McGill University, Montreal.

Doctor Louis Gross, McGill University, Montreal.

Miss Mossop, Western University, London, Ont.

Miss Anderson, Fredericton, N.B.

Mr. Leim, Toronto University, Toronto.

Dr. W. G. Savage, Bristol England.

W. Savage, Bristol, England.

Dr. Huntsman and Professor Prince, and the permanent aids on the staff: Messrs. E. G. Rigby, A. E. Calder, M. Bartlett, and Miss Harris and Miss Rigby.

Doctor Klugh, Kingston, and Mr. D. A. MacKay, Science Master, Collegiate Institute, Ottawa, did important lobster and other work in New Brunswick and Prince Edward Island. Over forty fishery problems occupied the staff's attention, of which the most important were:—

(1) Investigation of lobster breeding grounds, St. Mary's bay, by regular dredging, beam trawling, shrimp trawling, seine and special traps at regular intervals weekly. The launch *Prince* was busy with these investigations from June to September, and collected also “plankton” and hydrographic material for study. Doctor Cox, Doctor Connolly and Doctor Huntsman took part. Doctor Mavor completed, at the same time, a study of water movements in the southern half of the Bay of Fundy.

(2) The shad fisheries, spawning grounds, resorts of young shad, food, movements, etc., occupied Mr. Leim from July 29 to September 3. The Shubenacadie and Annapolis rivers were specially studied, and Doctor Huntsman assisted Mr. Leim's work.

(3) A disease of the salmon near Campbellton, New Brunswick, was studied by Doctor Huntsman.

(4) The young lobster distribution in Richmond bay, Prince Edward Island, and other localities, occupied Mr. Klugh and Mr. A. D. MacKay, under Professor Knight.

(5) Deterioration of canned lobsters and other bacteriological fish questions were the subjects of research by Miss Shanley and Miss Macfarlane, both experts of high repute.

(6) The mussel as a new food, its culture, growth, etc., were questions laboriously investigated by Miss Mossop.

(7) Food of fishes, especially diatoms in the surface life of the sea, occupied Professor L. W. Bailey.

Valuable material for the study of specialists in various university laboratories was collected by the staff and was studied as follows:—

(a) Professor Willey, McGill.—Stomachs and food contents of plaice and other flat fishes.

(b) F. Johansen, Ottawa.—Life-history of sea perch or cunner, and its value as a new food fish.

(c) Professor Clara Benson, Toronto.—The flesh of skate, dogfish, etc., as food.

SESSIONAL PAPER No. 40

(d) Miss Neff, Toronto.—The hake as a food fish and reasons for unsatisfactory refrigeration of the same.

(e) The late Prof. E. MacKay, Halifax.—Spoiling of canned lobsters and clams.

(f) Prof. Piersol, Toronto.—The flesh of the hake as a food (histological study).

(g) Dr. Clemens, Toronto.—The Mutton fish, a new food fish, and the ciscoes of lake Erie.

In addition to these lines of work, a committee was formed of representatives from MacDonald College, St. Anne; MacDonald Institute, Guelph; and the Domestic Science Department, Toronto, including Professor Clara Benson, Professor Annie Laird, both of Toronto, Miss Watson and Miss Hill; and reports have been already submitted by Dr. Benson and Misses McHenry and Martin on new varieties of fish upon the table and best modes of preparation and cooking.

The Biological launch *Prince*, under Captain Rigby, with Mr. A. E. Calder and Mr. D. V. Bourgeois, carried out the programme of observations in the Bay of Fundy during the winter months, and secured valuable information *re* the spawning and migrations of smelt, bass, tommy cod, etc., and taking temperatures and salinities.

Preparations for a course of biological and fish culture training for Dominion hatchery officers were made at St. Andrews, but the work was postponed until 1920. It was arranged also that Doctor Knight, Doctor Huntsman and Professor Prince should give addresses to the reorganized staff of fishery officers in the Maritime Provinces. Professor Prince gave twelve addresses in this connection in February and March.

Pacific Station, British Columbia.

The Pacific Station was chiefly occupied with problems relating to the salmon, herring, various rock cods, etc., and with the solution of questions referred for report by the Fisheries Department. The station's launch *Orduna* made continual cruises to the various fishing localities, and much material for determining the occurrence, migrations and feeding and breeding habits of fish was collected. Professor J. J. R. MacLeod, of Toronto University, got ample material of fresh value for his researches, and Mr. C. Berkeley completed an important report on the bacteriology and chemistry of sea water in connection with fish life.

Doctor Fraser, in view of the shortage of university professors in British Columbia University, spent three months in Vancouver, giving university lectures in zoology at the request of the president, and with the sanction of the Biological Board.

The Museum and Library received valuable additions, and new apparatus and reagents for research were procured.

Publication of Reports.

The board have nearly ready for issue the following publications:—

(1) Leaflets.—Popular leaflets for the information of the fishermen and the public on new food fishes, new effective baits for fish, causes of decay of fish, etc., have been completed by members of the staff.

(2) Bulletins.—In addition to a handsome bulletin on the "Canadian Plaice," three new bulletins will soon be issued, viz.: The Lumpfish, by Professor Cox; The Angler Fish, by Professor Connolly, and the Mutton Fish, by Doctor Clemens.

11 GEORGE V, A. 1921

(3) A new volume of "Contributions to Canadian Biology," 1919-20, includes fourteen reports, many of them of great and immediate practical use to the public; others of scientific value as aids to the conservation and expansion of the fisheries. The titles of the reports in the series are:—

1. Further studies on the Growth Rate in Pacific Salmon. *By C. McLean Fraser, Ph.D., F.R.C.S., etc., Curator of the Pacific Biological Station, Departure Bay, British Columbia.*
2. Some Apparent Effects of the Severe Weather of the Winter and Spring (1915-1916) on the Marine Organisms in the Vicinity of Departure Bay, British Columbia. *By C. McLean Fraser, Ph.D., F.R.S.C., etc., Curator of the Pacific Biological Station, Departure Bay, British Columbia.*
3. Temperature and Specific Gravity Variations in the Surface Waters of Departure Bay, British Columbia. *By C. McLean Fraser, Ph.D., F.R.S.C., etc., Curator of the Pacific Biological Station, Departure Bay, British Columbia.*
4. Experimental Cultures of Diatoms Occurring Near St. Andrews, N.B. *By Clara W. Fritz, B.A., M.Sc., Principal of East Angus Academy, Quebec.*
5. Plankton Diatoms: Their Distribution and Bathymetric Range in St. Andrews Waters. *By Clara W. Fritz, B.A., M.Sc., Principal of East Angus Academy, Quebec.*
6. A Contribution to the Biology of the Mutton Fish (Zoarces). *By W. A. Clemens, Ph.D., Assist. Prof. of Biology, University of Toronto, and Lucy Smith Clemens, Ph.D.*
7. Eastern Canadian Plankton: The Distribution of the Tomopteridae Obtained During Canadian Fisheries Expedition, 1914-1915. *By A. G. Huntsman, B.A., M.B., F.R.S.C., Biologist to the Biological Board of Canada.*
8. Eastern Canadian Plankton: Distribution of Floating Tunicates (*Thaliacea*) obtained during Canadian Fisheries Expedition, 1914-1915. *By A. G. Huntsman, B.A., M.B., F.R.S.C., Biologist to the Biological Board of Canada.*
9. An Investigation into the Rate of Putrefaction in the Commoner Food Fish Caught in and Around Passamaquoddy Bay. *By Louis Gross, M.D., Douglas Fellow in Pathology, McGill University, Montreal.*
10. Canned Sardines: The Causes of "Swells" or "Blown Cans." *By Wilfred Sadler, M.Sc., University of British Columbia, Vancouver, Canada.*
11. List of Fishes Collected in 1917 off the Cape Breton Coast and the Magdalen Islands. *By Philip Cox, Ph. D., B.A., etc., Professor in Geology, University of New Brunswick.*
12. The Diatoms of Canada. *By L. W. Bailey, L.L.D., F.R.S.C., and A. H. MacKay, L.L.D., F.R.S.C.*
13. The Utilization of Dogfish and Selachians. *By Prof. J. W. Mavor, Ph.D., Union College, Schenectady, N.Y.*
14. Hydroids of Eastern Canada. *By C. McLean Fraser, Ph.D., F.R.S.C.*

SESSIONAL PAPER No. 40

NATURAL HISTORY INVESTIGATIONS.

The Fisheries Naturalist of the Department, Mr. Andrew Halkett, besides taking part during the year in the educational campaign for lobster conservation, referred to above, carried out the following investigations:—

Lobster observations on the coast of the Bay of Fundy, N.B., and at the Magdalen Islands.

Investigations into the condition of scallops at Mahone Bay, N.S.

Observations on the metamorphosis of the scallop.

Identification of a collection of specimens from Hudson Bay waters, received from Rev. W. G. Walton, missionary at Fort George, Que.

Details in regard to these investigations and their results are to be found in Appendix 2 to this report.

FISH CULTURE.

The fish cultural operations for the calendar year 1919 embraced the fresh-water and anadromous species only, and were confined almost entirely to the most important commercial food fishes, such as Atlantic salmon, in the east, whitefish, cisco, salmon trout and pickerel in the interior, and the Pacific salmon in the west.

The commercial species were practically all distributed as fry, after the food-sac was absorbed, on the natural spawning areas, and largely where such eggs were collected, but a small percentage was reared to the advanced fry and fingerling stages. The sporting species such as speckled trout in the east, and cutthroat and rainbow trout in the west, were hatched in small numbers, and after adequate return was made to the areas where the eggs were collected, were practically all distributed in public waters. A percentage was allotted to privately controlled or leased areas, on payment of nominal prices, and the distribution expenses.

The sockeye salmon hatchery on Stuart lake at the headwaters of the Fraser, which was closed in 1916, was reopened. It was filled to capacity with eggs collected in the Babine lake district on the Skeena, without any appreciable effect on the spawning areas of that district, as these were abundantly seeded, and there were more unspent salmon in the creeks where the eggs were collected at the close than at the beginning of the egg-collecting season.

The construction of a larger and more modern hatchery on Granite creek, Lakelse lake, was undertaken. This hatchery is to take the place of the old one that was put out of commission by floods in the fall of 1917.

The total distribution of all species was increased over that of 1918, by over 45,500,000.

The total collection of eggs in the east and in the interior, was not as large as usual, but the collection of the different Pacific salmon eggs largely exceeded that of recent years, and in addition, the spawning grounds of the British Columbia rivers, except the upper Fraser, were abundantly seeded.

There are 35 main hatcheries, 11 subsidiary hatcheries, and 6 salmon retaining ponds in operation. From these the total distribution of the different species in each province, during the season of 1919, was as follows:—

Distribution of eggs and fry by Provinces, during 1919.

Nova Scotia—			
Atlantic salmon.....	7,210,500		
Rainbow trout.....	83,000		
Speckled trout.....	330,000		
			7,623,500
New Brunswick—			
Atlantic salmon.....	9,482,305		
Speckled trout.....	348,600		
			9,830,905

11 GEORGE V, A. 1921

Prince Edward Island—		
Atlantic salmon.....	859,379	
Speckled trout.....	125,635	
		985,014
Quebec—		
Atlantic salmon.....	6,487,251	
Speckled trout.....	253,935	
		6,741,186
Ontario—		
Spring salmon.....	374,500	
Whitefish.....	276,710,000	
Salmon trout.....	31,746,850	
Herring.....	46,340,000	
Pickrel.....	177,150,000	
		532,321,350
Manitoba—		
Whitefish.....	297,975,000	297,975,000
Saskatchewan—		
Whitefish.....	59,039,000	
		59,039,000
Alberta—		
Atlantic salmon.....	154,574	
Rainbow trout.....	166,575	
Cutthroat trout.....	118,936	
Salmon trout.....	190,701	
		630,786
British Columbia—		
Atlantic salmon.....	320,000	
Rainbow trout.....	9,175	
Cutthroat trout.....	126,530	
Steelhead salmon.....	63,798	
Kamloops trout.....	1,198,300	
Sockeye salmon.....	54,443,875	
Spring salmon.....	2,722,960	
Cohoe salmon.....	3,952,819	
Pink salmon.....	40,000	
Chum salmon.....	383,000	
Speckled trout.....	17,052	
Whitefish.....	6,600,000	
		69,877,509
Total distribution.....		985,024,250

A detailed report on the fish cultural operations of the department is being published separately in pamphlet form.

The good effects of the fish culture service have become more and more manifest on all sides, with the possible exception, to some extent, of the sockeye salmon culture in British Columbia. But even in that fishery there is tangible evidence of its beneficial effects. Since the unfortunate depletion of the Fraser river, due to international conditions and railway building operations, the Skeena river is the most important salmon-producing stream in British Columbia. Two hatcheries, which have been propagating sockeye, have been in operation on this stream for some years. One of these hatcheries, which is located on a stream flowing into Babine lake, was placed where it is owing to the facilities the stream afforded for the operation of a hatchery, but the stream itself was not frequented to any important extent by salmon. After stocking this stream from the hatchery for some years, salmon now each year crowd into it in such large numbers to spawn that it is practically relied upon for filling the hatchery. Moreover, while for a long series of years the sockeye pack of the Skeena river had been going down, the decline ended in 1917, and during the past two years it has been rapidly recovering. Last season the sockeye pack there was 184,945 cases, or only about 2,000 cases less than the biggest pack ever put up on that river.

In the inland fisheries the good results are patent to all. Lake Winnipeg, the fisheries of which were in a seriously low condition some years ago, have been brought back, until now they are as productive as they ever were, the catch per net being as heavy as it ever was.

SESSIONAL PAPER No. 40

In the Great Lakes until recently fish hatching has been largely centered in lake Erie and in lake Ontario. Twenty-five years ago lake Erie, which is the greatest whitefish producer of the Great Lakes, was regarded as practically depleted of whitefish. The Canadian catch that year was but 1,480 cwts., but by co-operative fish-breeding efforts in both Canada and the United States, not only have the catches been rapidly increasing, until now they are, one year with another, bigger than they ever were, but since 1903 there has been no close season on this lake. In 1915 the Canadian catch had risen to 18,322 cwts. of whitefish. There have been fluctuations since, due to weather conditions, and not to the scarcity of fish.

Lake Ontario twenty years ago was also regarded as depleted of whitefish, the Canadian catch that year being 1,291 cwts. Now it is second only to lake Erie, the catch of such fish there last year being 13,365 cwts.

Atlantic salmon are increasing in the streams that are being stocked. The more important rivers are being maintained at a high state of productiveness and salmon are coming back to various streams, as a result of stocking, from which they were practically absent for many years. Recently one of our enthusiastic sport fishermen wrote to the department that he spent the 12th and 13th of September on the Petitcodiac river, which was then at high water, and it seemed almost full of salmon. He stated that if the stream is properly protected it will, in a few years, contain as many fish as it did in the early days of settlement, provided of course that the placing of fry in it each year is continued for some years to come.

OYSTER CULTURE.

The officer in charge of this service visited the various oyster beds in the gulf of St. Lawrence, cleaned such as required cleaning, and restocked others with young oysters.

From several oyster areas at Richibucto, N.B., 230 barrels of small oysters were taken, and planted in Brule harbour, N.S. Later in the season they were reported to be growing nicely.

The oysters planted in the Narrows below Richibucto during the preceding year were found to have lived and grown well.

While some young and healthy oysters were found in parts of Richmond bay, P.E.I., where the blight of a few years ago had practically killed off the stock, the conditions throughout the bay generally have not improved much, if any, and the officer in charge is unable to suggest any method by which improvement may be accelerated.

The beds at Shediac and Cocagne were examined and found to be in a very weedy condition. They were cleaned and raked. The Shediac beds especially would seem to require restocking, however.

INSPECTION OF FISH.

The inspection of pickled fish and barrels was carried on during the season of 1919 by one inspector in Nova Scotia, two in New Brunswick, and by one, during the winter herring season, in British Columbia.

The sudden ending of the war in 1918 so upset markets for pickled fish that much of the herring pack of that year was carried over into the season of 1919. Part of it was sold for much lower prices than were anticipated when the curing was taking place, while part of it remained unsold throughout the whole of the latter year. As a consequence of these unsatisfactory conditions, and the

11 GEORGE V, A. 1921

high cost of barrels and salt, much less attention than usual was given to catching and curing herring during the 1919 season, and so the number of barrels of pickled fish submitted for inspection was smaller than in the preceding year.

The following shows the number of packers who submitted their fish for inspection and the number of barrels inspected annually since inspection was first made available.

Year.	Packers.	Barrels Inspected.
1915.....	16	1,320
1916.....	73	7,213
1917.....	80	8,977
1918.....	110	20,664
1919.....	82	8,730

Instruction was given in barrelmaking, and fish curing, by the inspectors during the season. The inspectors, on occasion, have had to make stencils, repair damaged barrels and even dictate the correspondence of some of those seeking advice.

It should be noted that the Inspection Branch extends its instruction beyond barrel making, and the packing of fish. For example, by the advice and under the supervision of this branch, two firms on the Gaspé coast erected smokehouses and started the smoking of fish last spring.

The Act under which inspection is carried on, which was passed in 1914, was designed to encourage improved methods of putting up pickled fish and the use of proper barrels. It does not, however, compel the use of improved methods. It simply provides that packers using proper packages and putting up their fish accordingly may have their packages and fish inspected, and if found to be in accordance with requirements, the former will be branded with a Government brand as a guarantee of the quality of the contents. While, as a result of this Act, and the direct instructions given by the general inspector and district inspectors of pickled fish, and the continuous efforts that were made to induce packers to adopt better methods, some progress has been made, it has been slow. Indeed, those interested are almost unanimously of opinion that before the standard of our pickled fish can be raised to the level on which it should be, it is necessary to compel packers to use proper packages and put up their fish according to proper methods. To this end a Bill to amend the Fish Inspection Act was introduced into the House of Commons and had its first reading on the 28th of March, 1919. It was then referred to the Select Standing Committee on Marine and Fisheries, for consideration, but unfortunately the time of that committee was so continuously occupied that it was unable to deal with the Bill. It is, consequently, proposed to take up the matter again during the next session of Parliament, when it is hoped that an amending Act will be passed.

It is considered well, however, to lay stress here on the fact that those engaging in the industry should not rely too far on legislation to encourage better methods. It is realized by the leaders in the industry that Canada cannot take the place that she should in the fish markets of the world unless her producers provide articles of standard quality. It is to be hoped that these leading producers will not only insist on first-class quality in all that they themselves produce, and will study the classes of curing designed to meet the tastes of the different importing countries and prepare their fish for such countries accordingly, but that they will do their utmost to influence the smaller producers on all parts of the coast to do likewise.

SESSIONAL PAPER No. 40

CANNERY INSPECTION.

During the canning season of 1919, the outside staff of fishery officers systematically inspected all fish and shellfish canneries.

This inspection is carried on under authority of the Meat and Canned Foods Act, and attention is given chiefly to seeing that buildings and utensils are in accordance with the standards laid down in the regulations; that fish undergoing the process of canning are sound, and fit for human food; and that the cans contain the weight of fish prescribed by, and are marked in accordance with the law.

There were in operation on the Atlantic coast, 544 establishments canning lobsters; two canning sardines; one canning salmon; four canning clams; and fifteen canning other fish such as mackerel, cod, and haddock.

On the Pacific coast salmon were canned in seventy-seven establishments; herring, pilchards, etc., in seven; and clams in one. In the Prairie Provinces lake fish were canned in one establishment.

In all, 1,882 inspections were made and reported on during the year, and while no very serious defects were found, a number of minor faults in buildings and equipment were noted and corrected.

DRIFT-NET FISHING OPERATIONS.

As in the preceding year, the steamer *Thirty-Three* was equipped with herring and mackerel nets and sent to sea in the summer of 1919.

Operations began in the end of May, and continued till the middle of September, with intervals due to unfavourable weather, and the need for repairs to gear.

From May 27 to June 10 mackerel fishing was carried on in the waters ranging from Cape Sable to Cape Canso, and resulted in a catch of 17,530 pounds of mackerel.

From June 13 to June 25 mackerel fishing was continued in the waters between Inverness county and Prince Edward Island, when a catch of 25,795 pounds of mackerel was landed.

From July 6 to July 9, herring fishing was carried on off Halifax and resulted in a catch of twelve barrels.

From July 16 to July 20, herring fishing was continued off Port Hood, Inverness county, but only one barrel of herring and 319 pounds of mackerel were taken.

From July 28 to August 2, operations were carried on off North Sydney, but no fish were taken.

From August 8 to September 15 herring fishing was continued in Chaleur Bay, when 184 barrels of herring and 1,500 pounds of mackerel were taken.

The fish were sold in the port nearest to the fishing ground being operated on, where buyers were found prepared to handle the catches.

BAIT-REPORTING SERVICE.

The bait-reporting service was instituted for the purpose of directing masters of fishing vessels and those in search of bait to where supplies might be available throughout the spring, summer and fall. Definite information is gathered by officers of the department as to the quantities of bait landed along certain stretches of the coast day by day. These officers send the information by telegram daily to certain ports, where it is posted up. The information is also published free by the Halifax daily newspapers.

11 GEORGE V, A. 1921

In the spring months telegrams giving information as to ice conditions and bait supplies were sent from the Magdalen Islands, Souris, P.E.I., Queensport and North Sydney, N.S., to Canso, Halifax, and Lunenburg, N.S.

During July and August telegrams were sent from Canso, Wine harbour, and Musquodoboit harbour, covering the coasts of Guysboro and Halifax counties, to North Sydney, Canso, Halifax, Lunenburg, and Shelburne, N.S. Also, from Lockeport to Halifax, Shelburne, and Barrington Passage, the latter for transmission by telephone to Clark's Harbour and Port Latour; and from Shag Harbour, Yarmouth, and Digby to Halifax, Shelburne, Lockeport, and Barrington Passage, N.S.

From September to the middle of November telegrams were sent from Campobello, N.B., covering information as to supplies of bait in the counties of Charlotte and St. John, N.B., to Digby, Yarmouth, Pubnico, and Barrington Passage, N.S.

FISHERIES STATISTICS.

Under an arrangement between this department and the Dominion Bureau of Statistics, the latter now compiles and publishes the annual statistics relating to the fisheries, as part III of its census of Industry. The information is secured partly from manufacturing establishments, on individual schedules designed to fit in with the Bureau's general scheme of securing industrial statistics, and partly by the officers of this Department, from those fishermen and dealers who are not classed as manufacturers, but who market their own produce. The returns from both the manufacturers and our officers are checked in this department, and afterwards handed over to the Bureau of Statistics for publication. A general review only, made up from information obtained by the department from time to time, is given in this report.

Monthly returns of the quantities and values of sea fish landed are sent to the department, as usual, by the officers in sea-fishing districts. The returns are checked and compiled to show the landings in each county and province, and in the whole of Canada. The compiled information is then summarized in a report by the department and made public through the press, monthly.

FISHING BOUNTIES.

Under the authority of "An Act to encourage the development of the Sea Fisheries and the building of Fishing Vessels," the sum of \$160,000 is appropriated annually by the department and paid to fishermen of the eastern Maritime Provinces. The bounty is distributed under regulations made from time to time by the Governor in Council.

For the year 1919 payment was made on the following basis:—

To owners of vessels entitled to receive bounty, \$1 per registered ton; payment to the owner of any one vessel not to exceed \$80.

To vessel fishermen entitled to receive bounty, \$6.40 each.

To owners of boats measuring not less than 13 feet keel, \$1 per boat.

To boat fishermen entitled to receive bounty, \$4.10 each.

There were 13,068 bounty claims received, and 13,061 paid. In the preceding year 14,452 claims were received, and 14,440 paid.

The total amount paid was \$155,136.70, allocated as follows:—

To 749 vessels and their crews, \$52,996.05.

To 12,319 boats and their crews, \$102,146.65.

The following table shows in detail the payment of the bounty by counties for the year 1919:—

Provinces and Counties.	No. of vessels.	Tonnage.	Average Tonnage	No. of Men.	Amount paid. \$ cts.	No. of Boats.	No. of Men.	Amount paid. \$ cts.	Total Bounty paid to vessels and boats, 1919. \$ cts.
Nova Scotia—									
Annapolis.....	1	13	13	3	32 20	154	256	1,202 30	1,234 50
Antigonish.....						139	193	1,930 30	930 30
Cape Breton.....	26	402	15	116	1,142 15	467	871	4,035 70	5,177 85
Cumberland.....						3	5	23 50	23 50
Digby.....	6	164	27	50	483 10	354	601	2,818 10	3,301 20
Guysboro.....	58	923	16	295	2,808 15	792	1,283	6,047 90	8,856 05
Halifax.....	66	1,032	16	306	2,987 10	1,292	1,734	8,400 50	11,387 60
Inverness.....	28	436	16	127	1,248 80	384	778	3,575 90	4,824 70
Kings.....	1	11	11	3	30 20	53	76	364 60	394 80
Lunenburg.....	145	8,815	61	2,316	23,626 65	536	639	3,155 90	26,782 55
Pictou.....	1	15	15	2	27 80	46	61	296 10	323 90
Queens.....	12	146	12	31	344 40	152	258	1,209 80	1,554 20
Richmond.....	41	737	18	208	2,065 50	470	810	3,791 00	5,856 50
Shelburne.....	32	669	21	220	2,073 55	551	1,078	4,970 80	7,044 35
Victoria.....	12	162	14	52	494 05	337	516	2,452 60	2,946 65
Yarmouth.....	29	1,209	42	388	3,689 20	119	262	1,193 20	4,882 40
Totals.....	458	14,734	32	4,117	41,052 85	5,849	9,421	44,468 20	85,521 05
New Brunswick—									
Charlotte.....	9	117	13	25	273 00	382	636	2,985 75	3,258 75
Gloucester.....	243	3,517	14	1,056	10,268 75	162	381	1,724 10	11,992 85
Kent.....	7	72	10	17	180 80	44	72	339 20	520 00
Northumberland.....	2	34	17	8	85 20	2	4	18 40	103 60
Restigouche.....						5	11	50 10	50 10
St. John.....	1	14	14	3	33 20	16	27	126 70	159 90
Totals.....	262	3,754	14	1,109	10,840 95	611	1,131	5,244 25	16,085 20
Prince Edward Island—									
Kings.....	8	138	17	26	304 40	395	556	2,674 00	2,978 40
Prince.....	7	99	14	28	278 20	406	938	4,242 70	4,520 90
Queens.....	2	24	12	4	49 60	116	253	1,153 30	1,202 90
Totals.....	17	261	15	58	632 20	917	1,747	8,070 00	8,702 20
Quebec—									
Bonaventure.....	2	26	13	8	77 20	876	1,569	7,306 20	7,383 40
Gaspé.....	7	76	11	25	245 85	2,977	6,098	27,966 40	28,212 25
Rimouski.....						83	121	578 80	578 80
Saguenay.....	3	45	15	15	141 00	1,006	1,831	8,512 80	8,653 80
Totals.....	12	147	12	58	464 05	4,942	9,619	44,364 20	44,828 25
Grand Totals.....	749	18,896	25	5,342	52,990 05	12,319	21,918	102,146 65	155,136 70

11 GEORGE V, A. 1920

PROPOSED NEW ACTIVITIES.

PROPOSED SCIENTIFIC DIVISION.

At the present time the Canadian Biological Board is the only institution carrying on fisheries scientific investigations. While this board, particularly in more recent years, has been doing good work, it is a volunteer organization, and consequently cannot be expected to cope with the vast amount of fisheries research work that should be undertaken without delay. It is of primary importance that thorough investigation should be made to ascertain the migrations of fish, the causes of such migrations, the effects of different methods of capturing fish, the spawning places of fish, the haunts of young fish, the abundance of the organisms which supply food for fish, and to secure information on a great number of other questions. Also, close study should be made into methods of preservation of fish. While the preservation of fish by salting has been in practice for hundreds of years, little improvement in the methods has been devised, strange to say. Each year, large quantities of fish are either spoiled in curing or are of a low grade, owing to lack of knowledge on the part of those carrying out the operations as to certain causes and their effects.

Keeping in view the fact that at least 25 per cent of the weight of fish caught is unedible, but that this unedible fish can be converted by proper methods into oil of high grade, and into valuable food for stock, which in turn becomes food for man—as well as into unusually good fertilizer, to increase the crops on which stock feeds, it is a matter of great regret that up to the present no feasible means of handling fish offal so as to convert it into such products, has been found on the large portions of the coast, where the quantities produced are now comparatively small. It is obviously of great importance that close investigation be made with the object of finding some means, either by cheap concentration of the raw material at the places it is produced, and sending the concentrated article to a central plant to be finished, or otherwise.

As the waters of our Atlantic coast resorted to by our fishermen are also frequented by those of Newfoundland and the United States, and those on the Pacific coast, by our own fishermen and those of the United States, such research work is of as much interest to these countries as it is to Canada. Obviously, it could be carried out most economically most efficiently and most expeditiously, through joint action by the three countries. Hence, steps have been started looking to the formation of a scientific council consisting of representatives of these three countries for the carrying out of such work. It is hoped that such can be effected during the year 1920–21.

To take direct charge of such work, it has been decided to add to the Fisheries Branch a Scientific Division. It is hoped that when this division gets into active operation, the trade will closely co-operate with it, and will not fail to make it a practice to refer to the department for thorough investigation any problems that may arise in their experience. Also, that they will always be ready to assist in proper investigations, by observing and tabulating such data as may be desired.

PROPOSED TECHNICAL EDUCATION.

Prior to the war, the Fisheries Branch had desired to take up the question of technical education amongst the fishermen, embracing not only the better handling of fish, but also navigation, the operation, adjustment and effecting of minor repairs to gasoline engines, improved methods of fishing, etc. It was then found necessary to await consideration of the whole question of such education, in the light of the report of the commission that had been appointed to fully investigate the matter; but this was delayed by the war. It is, however, hoped that following the legislation of last year for the assistance of technical education, it will be found possible for at least the different provinces specially interested, with the federal aid available, to take up such work.

SESSIONAL PAPER No. 40

Direct educational work amongst the fishermen and producers has, however, been given such attention as has been possible, and during the coming year it is contemplated that it can be expanded to an important degree, by direct instructions in the packing and curing of fish, and in the handling of fresh fish.

RE-ORGANIZATION OF THE OUTSIDE SERVICE.

The previous service—with the exception of that in British Columbia, where reorganization was effected before the war—was merely a growth of the organization originally made following Confederation. It contemplated the employment of a large number of local officers who were not paid anything like a sufficient salary to enable them to devote their whole time and attention to their duties, and consequently, as a general thing, they were first of all farmers, blacksmiths, etc., and afterwards fishery officers. Besides while the salary was small, these officers, when using their own teams, were allowed to charge ten cents a mile for travelling. This resulted in much unnecessary travelling, which made the service on the whole an expensive one, though it was far from adequate. There were in the previous service some officers who were striking exceptions to the general rule and who were efficient to a high degree. It was a painful matter to the department to find it necessary that the employment of such men should be discontinued to enable a reorganization of the whole service to be effected.

Under the reorganized service, Canada—with the exception of Ontario and the inland waters of Quebec, where the fisheries are being administered by the provinces—is divided into three main fisheries divisions, the fisheries within each being similar in character. These divisions are:—

Eastern Division—consisting of the Atlantic provinces.

Prairie Division—consisting of the three Prairie Provinces and the territories north thereof.

Western Division—consisting of British Columbia.

Each division is placed under the direct supervision of a chief inspector. This officer is given extensive powers so that he can co-ordinate the whole service in his division to the best advantage by moving patrol-boats from one district to another as needs require, as well as by using the services of the overseers for certain districts in others at special times, etc.

Each province is, as heretofore, divided into district inspectorates, and these districts are again subdivided into overseers' districts, each of which latter, however, is made as large as it is practicable for one man to supervise by giving his whole time and attention to his duties. The overseers appointed for these districts were selected by the Civil Service Commission and were required to have qualifications that would assure efficient performance of their duties. They must devote their whole time and energies to their duties, and are also called upon to provide themselves, at their own expense, with horses and vehicles, and where needed, with motor-boats or canoes, for the maintenance of which a reasonable allowance, in addition to their salaries, is made; but no charges may be made for travelling in addition to the actual hotel expenses of the officers themselves. In the Eastern Division ninety-two overseer positions have been replaced by fifty-six.

The duties of the new officers will not be confined to preventing violations of the law. Following their appointment they were called together in groups and given a preliminary course of instruction on fish life, as well as on their administrative duties, and it is the intention to arrange for a course of instruction to them each year at a suitable time, covering fish life, curing and packing of fish, etc., so that they will not only be able to intelligently bring to the attention of the department the things that should be done to facilitate the industry, but will be helpful to those engaging in the industry in a direct way.

11 GEORGE V, A. 1920

It has, at times, been urged that Canada is spending too much in the protection of her fisheries, but an examination of the conditions will make it obvious that keeping in view the vast amount of work involved the service is being carried on in an unusually economical manner. It must not be overlooked that unlike most other countries having fisheries of importance, the Canadian federal authorities are responsible for the regulation and administration of the fisheries not only on our extensive sea coasts, but in all parts of our great Dominion, with the exception of Ontario and the inland portions of Quebec.

It must also not be overlooked that the Canadian inshore and inland fisheries, consisting of salmon, lobsters, smelts, whitefish, salmon trout, pickerel, etc., etc., make up at least half the total value of the fisheries of our country; and, from the nature of these fisheries, if they were not carefully protected, they would be depleted in a few years.

On account of the greater abundance of the fisheries and the greater density of the population, relatively more officers are employed in the Maritime Provinces than in any other part of the Dominion. An examination of the average size of the districts there will, therefore, give at least a fair indication of the protective service employed, and will show that it is no greater than experience has made it clear is absolutely necessary if an efficient service is to be maintained. Obviously it would be better to have no service than one that would not reasonably carry out the duties involved, as a waste of money would result.

Nova Scotia covers 21,528 square miles, and owing to its shape it has an unusually extensive coast line, all of which is adjacent to waters containing valuable fisheries. It also has a large number of splendid fishing streams and lakes. We have in Nova Scotia three district inspectors of fisheries and thirty-two fishery overseers, or an average of $672\frac{3}{4}$ square miles of land to each overseer.

New Brunswick covers 27,911 square miles and possesses several large rivers, and a great number of smaller ones, as well as lakes. There we have three district inspectors and twenty-one overseers, or an average of 1,329 square miles for each overseer.

Prince Edward Island has an area of 2,184 square miles. It also is plentifully supplied with streams. There we have one inspector and four overseers, or an average of 546 square miles to each overseer.

As above indicated, in the western provinces the area under the supervision of each overseer is vastly larger.

These overseers are also charged to see that the coastal fisheries are carried on properly and that no illegally caught fish are landed. To assist them in doing this a Fisheries Patrol service has been found absolutely essential; but this patrol service also is as small as is compatible with efficiency. The Atlantic coast line is approximately 5,000 miles long, without taking into account the smaller indentations. We maintain there fifteen small patrol-boats and one fairly large steamer. Thus on the average, each boat has $312\frac{1}{2}$ miles of coast to patrol. The steamer is needed to control conditions in the northern part of the gulf of St. Lawrence. On the Pacific coast there are about 7,000 miles of sea coast. There we maintained this year twenty boats, or an average of 350 miles to each boat. It is true that during the height of the salmon-fishing season eighteen additional boats were hired, mainly for short periods, but even with these, there was at that time an average of 184 miles for each boat.

While the reorganized service when it gets into proper working order will be a vast improvement in every way on the previous service, it will cost little if any more. It will relieve headquarters of a vast amount of detail that in the past has been so exacting as to leave too little time for consideration of constructive work, and, as previously indicated, it will therefore enable the branch to give greater attention to the devising and carrying out of measures for the general encouragement of the development of the fisheries.

REVIEW OF THE FISHERIES OF 1919.

The compilation of the statistics connected with the fisheries for 1919 has not been completed at the time of writing, consequently only an estimate of their total value and a general summary of the results of the year's operations can be given in this review.

The estimated marketed value of fish and fish products for the whole of Canada in the past year will be about \$58,000,000. This is less than that in the preceding year by about \$2,000,000. The falling-off in value is largely due to the very greatly reduced price paid for sardine herring in the Bay of Fundy, and to the diminished pack of chum salmon in British Columbia.

On the Atlantic coast weather conditions were quite favourable for fishing operations during the whole of the first half of the year, except in the last week of May, when a severe northeast storm destroyed a great many lobster traps and herring nets. In the second half of the year, short spells of bad weather occurred during July, September, and October. A heavy easterly gale in the first week of November wrecked or damaged many boats and much fishing gear, while a long stormy period in December seriously interfered with boat fishing.

On the Pacific coast the weather was rather unfavourable for fishing during the first half of the year, with the exception of the month of April. Good weather prevailed during the first three months of the second half of the year, but the final three months were characterized by rather unfavourable fishing weather.

ATLANTIC FISHERIES.

Cod, Haddock, Hake and Pollock.

Along the south shore of Nova Scotia cod, haddock and pollock fishing was exceptionally good. In the Cape Breton Island district, owing to lower prices and more remunerative employment on shore, the cod fishery was not prosecuted so vigorously as usual. The catch of haddock at Ingonish was less than in the preceding year, but around cape North, owing to the operation of more trap-nets, it was greater. The landings of two steam trawlers at Port Hawkesbury, however, made up for any slackness in line fishing in the district.

In the Bay of Fundy district of New Brunswick, the catch of cod and hake was good. Pollock were exceptionally plentiful at Grand Manan, but rather scarce at Campobello and Deer Island.

In the northern district of New Brunswick, which borders the gulf of St. Lawrence, cod, haddock, and hake were not landed in such large quantities as in the preceding year. Unfavourable weather towards the end of the season and the high wages offered for labour in the woods induced many of the fishermen to give up fishing earlier than usual.

In Prince Edward Island the result of the cod, haddock, and hake fishery was not quite so good as in the preceding year. On the coasts of Gaspé cod was scarce until the end of the season, consequently the catch was not so large as that of 1918. Cod appeared in very large quantities along the shore of Saguenay county from Natashquan westward, early in June, and good catches were landed. From St. Augustin eastward to Blanc Sablons ice remained on the coast till a very late date. After it left, cod appeared in large quantities for about three weeks and good hauls were secured.

11 GEORGE V, A. 1920

Mackerel, Herring and Sardines.

The mackerel fishery gave better results than in the preceding year. Very good catches were made in Digby basin and on the shore of Annapolis county in Nova Scotia. This had not been the case for a number of years. Mackerel were plentiful in the Cape Breton Island district; prices were good and those engaged in this fishery had a successful season. There was a slight increase in the catch in New Brunswick. The spring mackerel fishery at Magdalen Islands resulted in a somewhat smaller catch, owing to a storm at the beginning of the season, which did much damage to nets.

The herring fishery in Nova Scotia was not prosecuted with the usual vigour, owing to low prices and a poor demand, consequently the catch was less than that of the year before. Taken over all, the quantity of herring landed in New Brunswick was about equal to the previous year's catch. At the Magdalen Islands these fish appeared in normal quantities in the spring. The catch was not quite so large as that of the preceding year, but it was sufficient to supply all the needs of the lobster and cod fishermen for bait, and of the smoke-houses.

The sardine fishery of the Bay of Fundy during the season under review was a very unprofitable one for fishermen. Sardine herring were never more plentiful in the weirs, but the price at which the fish were bought made the season financially one of the worst ever experienced. The ending of hostilities in November, 1918, almost entirely stopped the demand for canned sardines, and when the season of 1919 arrived a large proportion of the abnormal pack of the preceding season was still unsold. Most of the canneries, therefore, remained closed until the season was half over and prices were paid at which fishermen could not afford to operate.

Other Sea Fish.

The landings of halibut and swordfish were greater than in the preceding year, but those of albacore flatfish and tomcod were rather less.

Shellfish.

The lobster fishery on all parts of the coast resulted in a catch that was very considerably greater than that of the preceding year. It must be remembered, however, that the preceding year's catch, mainly owing to much rougher weather, was little more than half the average annual catch of the four years which preceded it. The catch was exceptionally good on the New Brunswick side of the Bay of Fundy. In the Cape Breton Island district it was said to be a record one. Along the gulf shores of New Brunswick, and around Prince Edward Island, there was a greatly increased catch, notwithstanding destruction of traps by a gale at the opening of the season. The results on the Gaspé coast were equal to those of the preceding year, but at the Magdalen Islands there was a falling off in the catch as a number of fishermen considered the price insufficient and turned their attention to cod and mackerel fishing before the end of the season.

The quantity of oysters taken was slightly less than that in the preceding year. Clams of various kinds were taken in about the same quantity.

River Spawning Fish.

The total salmon catch on the Atlantic coast was 50 per cent less than that of the year 1918, which in turn was less than that of 1917. The falling off was equally pronounced on all parts of the coast.

SESSIONAL PAPER No. 40

While the smelt fishery was not quite so good in the northern part of New Brunswick, the principal seat of the fishery, owing to unfavourable weather at the opening of the season, it was better than that of the preceding year on all other parts of the coast.

The total catch of alewives was rather less, but its value was greater, owing to higher prices. Shad were not so plentiful as in the preceding year.

INLAND FISHERIES.

In the inland district of New Brunswick, which consists of the St. John River system, the catch of salmon for the season under review was said to be 25 per cent less than that for the preceding season.

The Ontario fisheries were not quite so good financially as in 1918. There was an increase in the catch of whitefish and of pike and a considerable increase in that of pickerel, but the quantity of trout taken was somewhat less, and of herring very much less.

There was an increase in the quantity of all kinds taken from lake Winnipegosis, Manitoba, during the winter season of 1918-19, but during the summer of 1919 the catch was less than half that of the preceding summer; pickerel, especially, being much less abundant.

In the northern district the total catch of all kinds during the winter of 1918-19, owing to a late start and fewer licenses having been issued, was less.

The summer fishery was practically a failure as a result of low water in the Saskatchewan river and tributaries, which prevented the collecting tug from reaching the fishing lakes.

The total catch of fish of various kinds throughout the province of Saskatchewan was not quite so good as that of the preceding year. While some lakes produced more others produced less, the increase or decrease in each case being due to a greater or smaller number of fishermen having operated. It is reported that none of the lakes show any sign of depletion.

In northern Alberta, there was a general increase in the production of fish. This was due to increased operations in lakes in which little fishing had previously taken place, to improved transportation facilities and to an increased local demand.

In the Yukon the run of salmon was not so good as in the preceding year, and the catch was small. In the Porcupine district, salmon fishing was a failure. The small run of salmon in the upper river is said to be due to the operations of a cannery at the river's mouth.

PACIFIC FISHERIES.

Salmon.

The total pack of all kinds of salmon throughout the province of British Columbia was 1,393,156 cases, against 1,616,157 cases in the preceding year. The decreased pack was mainly due to a falling-off in the demand for canned chum salmon, and to an increase in the exportation of the fish in a fresh state to the United States.

In the Fraser river district, the pack of sockeye salmon was greater by about 12,000 cases. The total pack of all varieties, however, was considerably less owing to the causes mentioned in the foregoing paragraph.

11 GEORGE V, A. 1921

In the northern district as a whole there was a shortage in the salmon pack of approximately 100,000 cases. The diminished pack is chiefly attributable to the Naas river, Rivers inlet and Bella Coola sections. While the sockeye run was as good as ever in the Naas river that of all other kinds was a complete failure owing, it is said, to the use of traps outside the Pearse canal.

Sockeye in the Skeena river were more abundant than they had been since 1913. Spring salmon were not so plentiful, however, and the run of pinks and cohoes was a poor one.

In the Bella Bella section all varieties of salmon were fairly plentiful, and the pack was above that of the preceding season. In Smiths inlet there was good run of all kinds. At the Massett inlet, Skidegate inlet and on the west coast of Queen Charlotte islands, salmon fishing was poor; but, from Cumshewa inlet southwards, chum salmon were plentiful.

In the Vancouver island district, the total catch of salmon was greater than that of 1918. The total pack was less, however, owing to the great exportation of fresh chum salmon to the United States.

Trolling for spring and coho salmon was carried on by a greater number of fishermen and while the individual catches were not so large, owing to unsuitable weather, the aggregate take by this method was fully equal to that of the preceding year.

Halibut.

The halibut fishery was successfully prosecuted from Prince Rupert and the total quantity landed was greater than in the year before. It has to be noted, however, that the landings of American vessels account for almost two thirds of the total.

Herring.

Herring were very abundant in the vicinity of Nanaimo harbour, and in the Barclay sound district, during the winter season of 1918-19 and large quantities were taken. After the signing of the armistice, in November, 1918, the demand for pickled herring in the United States, the chief market for such, fell off. Consequently, the quantity prepared in that way was much less. There was again a large pack of canned herring, while the quantity drysalted for the orient very greatly increased.

Other Sea Fish.

Pilchards of excellent quality were abundant on the west coast of Vancouver island and a large quantity was taken, most of which was canned. The business of canning these fish is increasing year by year. The catch of black cod was about the same as that in the preceding year. The landings of flatfish increased by about 30 per cent while those of red cod increased by about 14 per cent.

Whales.

The Kyuquot Naden Harbour and Rose Harbour whaling stations were operated during 1919 and the number of whales landed was 432. No whale meat was canned.

SESSIONAL PAPER No. 40

GENERAL.

Unquestionably, good progress in the industry is being made. More care is being given year by year to the curing of our fish, and up-to-date methods of fishing are becoming more general.

Steam trawling has become firmly established on our Atlantic coast and, to a limited extent, on our Pacific coast. Drifting, particularly for mackerel, is beginning to take the place of anchored nets. Inshore fishermen are rapidly equipping their boats with motors so that they may, in a large measure be independent of wind and weather and so spend a great deal more time in actual fishing. In 1910 there were but 2,200 motor-boats used in the Atlantic fisheries. In 1919 the number had risen to about 12,000. For the whole of Canada the number is about 14,000.

I very much regret having to report that twenty-four men, seventeen on the Atlantic and seven on the Pacific—lost their lives in the prosecution of the fisheries, during the year.

In conclusion, I would express my high appreciation of the manner in which the officers and clerks of the Fisheries Branch performed their duties during the year.

I am, sir Your obedient servant,

G. J. DESBARATS,

Deputy Minister of the Naval Service.

APPENDIX 1.

REPORTS OF INSPECTORS OF FISHERIES.

REPORT OF CHIEF INSPECTOR, WARD FISHER, EASTERN FISHERIES DIVISION, FOR 1919.

Although I was appointed in August, 1919, under the reorganization of the outside fisheries service, as the chief inspector of the Eastern Fisheries Division, I did not actually take charge of the work until the latter part of November, and therefore had not been in a position to closely follow the operations carried on in the division during the whole of the year. I have had, fortunately, however, considerable supervisory experience as one of the inspectors for an important section of the division, and also for some years previous to the present appointment been engaged in an administrative capacity as an assistant to the general superintendent, and am therefore, not unfamiliar with the actual operations carried on, and the conditions affecting the fisheries of the division.

The division comprises the fisheries of the three eastern provinces, New Brunswick, Nova Scotia and Prince Edward Island, covering a seacoast of over 5,000 miles, and occupying a most strategic position from a fisheries point of view, as the waters are abundant with the chief commercial and food fishes. The number of persons employed in primary operations is about 38,000, and in canning and curing about 8,000, or a total of 46,000. The capital invested is over seven million dollars, and the marketed value of the catches annually for the past several years is about \$20,000,000. Therefore it can readily be seen that industrially and commercially as well as from an economic point of view, the industry is already of great value and offers as a natural resource one of the best opportunities for development.

The conditions under which the industry is carried on, and the product prepared and marketed, are rapidly changing, and consequently the reorganization of the administrative service was most timely, and should be potent for much good in connection with the regulation, conservation and expansion of the industry. Necessarily the working out of the reorganization in a satisfactory manner will occupy much time and attention, but with favourable conditions the prospects for a thoroughgoing betterment of the service are hopeful.

The general conditions affecting the fisheries during the past year have continued to be somewhat abnormal as a consequence of the conditions arising from the great war. Briefly, the following résumé of the principal fisheries, together with certain observations thereon, are presented.

(1)

LOBSTERS.

There was a very considerable increase in the catch throughout the whole division as compared with the preceding year. In Charlotte and St. John counties, New Brunswick, where a size limit of 9 inches has prevailed, the catch was the greatest in twenty-five years. Large increases were also notable for Cape Breton Island and Prince Edward Island. The pack increase was about 20,000 cases, and the prices received for the canned product were greater than any previous year. A portion of the pack was disposed of at \$50 and more per case of 48 pounds. While transportation, exchange, and the greatly

SESSIONAL PAPER No. 40

unsettled world conditions appear to make the operations financially hazardous, the packers and dealers were again successful in gauging the demand for the product, and the ability of distributed markets to negotiate successfully for the product.

This industry demands the best possible protection, and every insistence should be laid on the observance of the regulations. The emphasis that is being placed on this requirement is having a good effect, and the regulations are being better observed than at any period since the rise of the industry. The investigations carried on by the department the past several years, and the educational features in connection therewith, have been of great value, and should be systematically continued.

The present regulations are, generally speaking, the most satisfactory yet devised.

(2)

COD AND HADDOCK.

The cod and haddock fisheries provide the chief food fishes, and offer fine opportunities for development. While the catches in Cape Breton Island, especially Inverness county, and also on the Nova Scotia side of the Bay of Fundy district, and on the coasts of New Brunswick and Prince Edward Island were not as large as usual, there was considerable increase in the catches landed on the Nova Scotia south shore ports, and also from the steam trawlers operating off Port Hood and Judique. The catch of the Lunenburg banking fleet was about 300,000 quintals, which is an increase of some 50,000 quintals over the preceding year. The prices of the dried product ruled high, averaging about \$12 per quintal.

It will be interesting to note that there has been little or no increase in the volume of the catch for some years, and this condition is generally deplored when it is pointed out that the markets can absorb a very greatly increased catch. It should be observed, however, that the deep-sea fisheries generally of the whole division, show a similar lack of expansion. Several considerations enter into the study of the situation:—

(1) Notwithstanding the very great improvement in small boat fishing, due to the replacing of the row and sail boat by the adoption of the modern motor-boat, there has been little or no increase in the number of vessels employed. Indeed, if it had not been for the operations of some five modern steam trawlers the catches of cod and haddock would have been insufficient to meet the demands of the fresh fish trade alone.

(2) The small prices secured for the fresh fish by the small boat and vessel fishermen affected the volume of the catch during the past year. While the cost of boats, gear and supplies, and also the cost of living has very greatly advanced, the prices secured by the fishermen on a large portion of the coast have increased only to a small degree. This has been true the past year in many sections of the New Brunswick and Cape Breton Island coasts, and has prevented a considerable number of the fishermen from diligently engaging in the work.

(3) The large stretches of coast without rail or steamboat facilities prevent advantage being taken of the best and most profitable markets. Also, the lack of adequate cold storage prevents the preservation of the catches to suit market and available transportation facilities.

On the other hand, it should be pointed out,—

(1) That our fishing population, even at the more advantageously located points, is not adequate to supply the demands for experienced fishermen, notwithstanding that at the favoured points the rewards of the industry are sufficiently great to tempt the enterprising and industrious. Such ports as Digby, Yarmouth and Lockeport find it difficult to steadily man the boats and vessels.

11 GEORGE V, A. 1920

Even Lunenburg, with its wonderfully prosperous slack-salted and dried fish industry, cannot greatly increase its fleet owing to the scarcity of men. Unless there is a rapid increase in the fishing population, and the building of winter fishing fleets, the industry can only be extended by the operation of additional steam trawlers.

(2) While it may reasonably be contended that the rate received by the fresh fish fishermen for the catches landed has not increased in proportion to the increase in operating expenses, it remains true that no single natural resource offers the workers better opportunities than does the fishing industry. The prices vary with the local conditions obtaining, and the fishermen who are located at points where there is little or no competition for their catches should be encouraged to either properly cure and market their catches; or,

(3) Cold storage facilities should be extended so as to avoid glutting the markets, and to enable the preservation of the catches until the market conditions are favourable for the disposal of the catches at good prices. For instance, the prolific deep-sea fisheries of Cape Breton Island cannot be very greatly developed until adequate cold storage is provided, and also until reasonably safe harbours and anchorages are constructed. The present catches, while large in volume and value, comprise a mere bagatelle as compared with the possibility of easy and rapid increase.

(3)

HERRING AND MACKEREL.

The above observations are pertinent to a large degree to the herring and mackerel fisheries. The catches of both species are larger than usual in many districts, especially in Cape Breton and Prince Edward Island. It should be noted that these increases were in the districts where the equipment was modern. It should also be noted that some districts reported that owing to the increase in the cost of supplies such as barrels and salt, the fishery was practically abandoned when sufficient catches were secured to supply the local demand for fresh and pickled herring. This condition is deserving of serious thought. The quality of the catches of Atlantic fish, suitable for pickling is as good as can be secured in the waters of any country, and it would appear extraordinary that with herring selling at from \$8 to \$14 a barrel, and mackerel as high as \$40 per barrel, that the comparatively small increase in the cost of salt, barrels, and other containers, should make it possible to profitably prepare the fish for market so as to take advantage of the high prices referred to, secured for properly packed and cured fish. When it is remembered, however, that as a rule our pickled herring and mackerel bring a much lower price than that received for the pickled product of other countries, the explanation is perhaps evident. But the query is obvious: Why is it that the prices secured for our pickled fish are often lower than similar products from other countries? The answer is that our fish are too often badly cured and badly packed, ungraded, in inferior packages, with the result that the product could not command the best prices, even when marketed under the most favourable conditions. Indeed, the conditions have been so bad that many dealers will not buy pickled fish for export in the original package, and packing is so inferior as to jeopardize not only the business reputation of the dealers, but also any possibility of profitable business. It is fortunate that during the past several years, the demand of the better class trade has resulted in the more reputable dealers insisting upon better methods, and consequently those dealers have no difficulty in disposing of large supplies at good prices. While the department has already endeavoured to improve conditions, there is much need of continued and systematic efforts, and it is hoped that regulations will be adopted governing the curing, packing and grading of mackerel.

SESSIONAL PAPER No. 40

(4)

HERRING SARDINES.

The sardine industry, which is carried on extensively in the Passamaquoddy Bay district, experienced the worst season in its history; notwithstanding that enormous quantities of the fish visited the coast, the demand, owing to the extraordinary conditions, was small and the prices extremely low. In 1918 an abnormal pack of canned sardines was made on both sides of the boundary line. The large pack was in a great measure due to the requests of the Governments of both Canada and the United States for increased production of fish foods. After the signing of the armistice the demand for canned sardines almost entirely ceased, with the result that the 1919 season found the packers with a large proportion of the previous year's pack on hand. As a result, most of the canneries did not open until about the first of August last year, when the season was about half over. Ruinous prices were offered the fishermen for their catches and with the limited demand and the extraordinary large run in the weirs it was comparatively easy for the packers to buy the fish at their own prices. Ten dollars per hogshead was paid at the beginning of the season, and few were taken even at that small price. Later in the season the price was dropped to \$5 per hogshead, where it remained for the balance of the season. When it is remembered that the prices the preceding year ran as high as \$70 per hogshead, it will easily be understood that the industry last year was conducted at a great loss to the fishermen.

(5)

SALMON, SMELTS AND ALEWIVES.

These species of anadromous fishes are growing in value and importance each year. The smelt fishery has a marketed value of over \$250,000, while the alewife fishery is steadily growing in importance, the pickled product bringing as high as \$14 per barrel. The salmon fishery the past year was unusually poor, particularly during the first half of the season, although great numbers ascended the rivers late in the summer. The falling-off in the catches was most noticeable in the Restigouche, Miramichi, St. John, and Margaree districts.

It is quite evident that the fisheries referred to, and also the trout fishery, should be afforded the best possible protection. The salmon, alewife and smelt for their commercial value, and the trout, and also the salmon, for their sporting value. While it is possible that the wonderful extent and variety of our rivers and lakes make unnecessary any unusual activities in restocking, yet it should be remembered that our waters are visited each year, to the advantage of the population generally and to the communities in particular, by many thousands of sport fishermen. Also, the power and other industrial developments have seriously affected a number of the best fishing rivers and streams. Further, the very variety and extent of our rivers and lakes prevent, to a large degree, adequate measures being taken to protect the fisheries from depletion by illegal fishing methods. Every effort should be made to preserve and increase the supplies, not alone for the benefit of the recreation-seeking population, but also in the interests of the shore fisheries, as it is evidenced from investigation and observation, that a decline in the river fisheries is followed by a decline in the shore fisheries. Therefore, added importance is given to the protection of the river fisheries, from a distinctly commercial point of view.

11 GEORGE V, A. 1920

(6)

SHELLFISH.

The oyster fishery of the famous Buctouche, New Brunswick, and Bedeque, P.E.I., and adjacent districts, while showing an increase over the preceding year, is deserving of serious consideration, as the condition of the fishery is becoming more unfavourable each year. The dual administration in Prince Edward Island prohibits any efforts of general value, while the mud digging carried on extensively by the farmers in the vicinity of the oyster areas for the purpose of securing fertilizer, is destroying the grounds. Indeed, the encroachments upon the live beds by the diggers, some three hundred of which are operated in Prince Edward Island alone, is constant, and unless very decided action is taken to prevent or limit their operations, the oyster fishery will soon become extinct.

The scallop fishery is confined to Chester basin and Mahone bay district in Nova Scotia, and is an important industry employing some 500 boats during the season. There is evidence that over-fishing is having its ultimate result and action should be taken to curtail operations so as to prevent any dangerous disturbance of the balance of nature. From information at hand it would appear that scallop beds exist in other sections of Nova Scotia and also in districts in New Brunswick and Prince Edward Island. These districts should be examined to ascertain the extent of the areas and their commercial value, in order that the growing demand for this shellfish may be supplied, and the industry developed.

EDUCATIONAL.

The growing agitation for technical education is a most encouraging sign, as there can be no doubt that the industry will not fully take its place in the fish trade of the world until those engaged in the industry are familiar with the best methods of catching, curing, packing, and manufacturing the product so as to take advantage of the demand of the domestic and export trade. It is also quite true that the rapid development of motor power for small boat and vessel propulsion is bringing about a very decided change in the operations of the fishermen. The motor-boat permits the taking advantage of prolific fishing grounds which hitherto have been too distant for successful exploitation by sail and row-boat fishermen.

Technical education has been under consideration by the department for some years, but it has not appeared practicable to deal with the question until definite provision had been made for a foundation to properly organize, equip, and maintain the necessary essential work. Generous provision has been made in chapter 73 of the Statutes of 1919, entitled the Technical Education Act, whereby the sum of \$11,000,000 has been provided to enable the Provincial Governments to initiate and organize technical schools suitable for the instruction of those engaging in these trades and callings. The Act provides an excellent opportunity for the technical education of the fishermen of these provinces, by arrangement between them individually and the Federal Department of Labour, and it would appear opportune for a beginning in this regard. I would propose:—

(1) *School of Navigation*.—The work of the School of Navigation now centered at the Halifax Technical College should be expanded by extension courses to be held at fishing centres throughout the division. There are a large number of uncertificated masters and mates of fishing vessels who should be enabled to perfect their knowledge and take the examinations necessary for the master's or mate's certificates. Also, with the development of the motor-boat there is wide need of a better knowledge of navigation in order that the fishermen operating considerable distances from the shore, be more generally equipped

SESSIONAL PAPER No. 40

in this regard. At present, it is not possible nor practicable for the fishermen to attend courses at Halifax, and the proposal therefore to have well arranged short courses conducted at the various centres, at suitable seasons, would be of great advantage.

(2) *Motor Engine Mechanics*.—A knowledge of motor engine mechanics would be of great value. The introduction of the modern motor engine is having a wide influence on the industry. Too often, however, the operators of such engines, while ingenious and naturally quick to learn and apply "first aid," are under heavy loss caused by preventable breakdowns and repairs, besides using unnecessary supplies of gasolene. It is suggested, therefore, that courses conducted similarly to those referred to in connection with navigation, be prepared and held under competent men. This suggestion is apparently quite feasible.

(3) *Short Commercial Courses*.—While at present a considerable number of the fishermen prepare and market their own catches to advantage, a very considerable number are unfamiliar with the primary commercial processes, and therefore are not in a position to enter into the necessary negotiations for the marketing of their product. A short commercial course would be of value.

The three above-mentioned courses might be arranged as Technical College extension courses, and held in common, one with the other. I have consulted with Principal Sexton of the Technical College, who gave great encouragement to the proposals and expressed his willingness to co-operate in every possible way.

(4) *Fish Curing and Packing*.—Reference has already been made to the necessity of wider and more definite knowledge of the best and most remunerative methods for curing, packing and manufacturing the products of the sea. Careless and inferior methods prevent advantage being taken of the best markets and prices. While the "Meat and Canned Foods Act" and the "Fish Inspection Act" are wisely devised, it would appear that these alone, particularly as they are largely restrictive in their provisions, cannot possibly be effective in any large degree in influencing and educating the fishermen and dealers in the prime need of adopting the best methods in handling and preparing their products. Therefore it is necessary that competent instruction be given. It may be found difficult to adopt and carry on the necessary instructions in this regard until wider and more generous provision is made for the costs in connection therewith. It appears to me that the system of fishing bounties might well be changed, and the small bounties, large in the aggregate, given the fishermen could be used to better advantage in providing systematic instruction on the lines above suggested.

(5) *Fishery Officer Instruction*.—Under the reorganization of the Fishery Officer Service there is afforded a good opportunity of securing within a few years, a body of officials who are continually in close touch with all phases of the industry, and who may under proper training, become to a large degree, experts in connection with the fisheries of their respective districts. Under the reorganized service the positions of fishery officers become permanent, and their whole time is now required to be given to their duties and they are not permitted to engage in any other occupation. The arrangements that are being made to afford these officers systematic and well-defined courses of instruction, both technical and administrative, by gathering them together in convenient groups, at suitable places, from time to time, where lectures, demonstrations and experiments will be conducted respecting fish life and the various phases of the fishing industry, together with instruction in correct methods of administration of the fishery laws and regulations, and the numberless items that enter into this work should in a few years result in a staff of officers who will be able to efficiently serve the industry from the various standpoints.

11 GEORGE V, A. 1920

OBSERVANCE OF THE REGULATIONS.

The observance of the regulations is gradually improving from year to year, although much remains to be done before the conditions are reasonably satisfactory. It is, of course, difficult to adequately supervise the operations carried on along the extensive coast comprised in this division, and to afford protection against illegal fishing practices, too often prevalent in the multitude of rivers, streams and lakes. The lobster fishery has first demand, so far as the sea coast is concerned, and requires constant vigilance to prevent illegalities. The fishermen and cannery operators are, however, becoming quite alive to the necessity of protecting the fishery, and are, in a large measure, affording every assistance to the officers in enforcing the law. The fisheries of the river and other inland waters, are exceedingly difficult to thoroughly supervise and protect, as practically every river and stream is frequented by species of fish of importance, either locally or commercially, and are often relied upon to furnish needed supplies to the residents of the various localities. The conditions in the matter of pollutions from saw-mills, etc., are improving, and obstruction to the ascent of fish to the spawning grounds are being removed, or otherwise remedied.

There is great need of correct and systematic surveys being made of the inland waters, in order that intelligent and effective measures may be taken to preserve the fisheries. Action will be taken in this regard as expeditiously as possible.

I would express my appreciation of the interest of the inspectors and officers of the division. While many of the new officers are as yet unfamiliar with their duties, the evident desire of the returned soldier appointments to make good in their new positions is encouraging. Appreciation is also expressed of the assistance rendered by many public spirited citizens in the interests of the inland fisheries, and particularly of the kindly support and encouragement that the Victoria Protective Association through their secretary, Mr. George Kennan, have extended to the officers who have supervision of the sport fishing waters of Cape Breton.

REPORT OF INSPECTOR J. E. BERNIER, M.D., ON THE SEA FISHERIES OF QUEBEC, FOR THE YEAR 1919.

Notwithstanding that the fishing results of 1918 were barely average, the 1919 catch is even smaller, showing a decrease of over \$200,000 in value, despite the fact that the prices of all products of the fisheries have been steadily advancing. The decrease is due to various causes which affected the cod fishery in all sections of the district except at the Magdalen Islands; and to the complete failure in Saguenay county of the salmon fishery, which was also poor in the counties of Gaspé and Bonaventure. In Saguenay county some fishermen who used to catch from 400 to 500 salmon during the season, only succeeded in taking 40 or 50; and many did not think it worth while to leave their nets in the water during the whole time that fishing was permitted. The catch of all other kinds of fish was fairly good.

Owing to market conditions, the monetary returns have been sufficient to enable the fishermen to live until next season. The preceding years have been profitable, and the fishermen of the north coast and the Labrador consequently enjoy greater prosperity than formerly.

SESSIONAL PAPER No. 40

As far as fishing methods are concerned the fisheries of the Gulf division still remain stationary, except for the growing use of motor-boats. In spite of all the campaigns of the last few years to popularize the fishing industry, it is noticed that young men especially seem inclined to go away to the cities, or to take up any other occupation than fishing. Although the population is increasing in certain important localities, there is a decrease in the number of fishermen and fishing boats, which is becoming alarming.

The principal fisheries of my district are those for cod, lobsters, herring, salmon and mackerel. Of these cod is the most important, exceeding in value all other kinds of fish together.

COD.

In the county of Saguenay cod appeared near Natashquan at the end of May, where they were found in very large quantities during the first weeks of June. From there, they went westward along the north coast, and reached the neighbourhood of Saguenay river, where they had not been seen for many years. Extraordinary as it may seem, they went up as far as the estuaries of certain rivers, and at Moisie many hundredweights were caught in the nets which had been set for salmon.

Their presence, in almost unlimited quantities at the beginning of the season, promised large catches, and fishermen were prosecuting the fishery in a most active manner when large schools of porpoises appeared on the whole of that coast. During June, July and August, these kept moving continually eastward and westward near the shore between the entrance of the St. Lawrence, and Natashquan. Fishery Officer N. A. Comeau, of Godbout, thinks that these schools are composed of from 15,000 to 18,000 porpoises, and from information received through telegraph offices, he observed that they were moving at the rate of 80 miles per day.

During the two or three days following each appearance (which took place three or four times monthly) cod rapidly disappeared, and it was impossible to catch any even in small quantities.

The oldest fishermen noticed, from time to time, some isolated porpoises in the gulf, but never saw nor heard of such large quantities appearing together. In supposing that each of these 15,000 or 18,000 porpoises consumed one hundred pounds of fish per day, we will have an idea of the enormous quantities that can be destroyed during a whole year, or even during a season.

About twenty years ago some naturalists, among whom was Mr. A. M. Montpetit, called the attention of the public to the enormous destruction of food fish by these porpoises; and they foresaw that, owing to their increasing number from year to year, there would come a time when they could not find food in the river, and would invade the gulf and there cause considerable damage to fisheries.

This anticipation was realized during the last season with the above consequences, which would have been disastrous if cod had not remained in such large quantities.

If it is admitted that these porpoises went into the gulf because they could not find in the river as much food as they needed, it is difficult to believe that the waters they have ruined gradually for many years will have time to restock themselves enough to permit those porpoises to live there permanently in future.

In Labrador, cod fishing was made impossible until the end of July, owing to the presence of ice which disappeared only late in spring, to be replaced almost immediately by other ice coming from the strait of Belle Isle. On the 8th July, following a strong eastern wind, a large field of ice was dispersed on an area of

11 GEORGE V, A. 1920

about 100 miles, and obstructed the coast from Blanc-Sablons to St. Augustin. During the last week of the month, after ice had been removed by a strong wind, cod showed itself in large quantities up to the 15th August, and big catches made up for the failure of the beginning of the season.

In the counties of Gaspé and Bonaventure, and more particularly on the coast of Baie des Chaleurs, cod was scarce until fall, and no reason was found for the same.

LOBSTER.

In Magdalen Islands, the catch for 1919 shows a falling-off, due to the fact that fishing was conducted with less activity than in the past year, more than to the decrease of lobsters, which have always been of a good size and which remained in quite large quantities. The rather small prices paid to fishermen induced the latter to quit before the end of the season on the 20th July, and to give their time to cod and mackerel fishing which were more profitable.

In the counties of Gaspé and Bonaventure, the results were practically the same as those of last year.

The lobster canning has been discontinued in Anticosti island. In Labrador, many owners of lobster factories obtain licenses without, however, keeping their factories in operation, so much so that in the county of Saguenay the pack was only one-fourth of that of 1918.

It is true that in these far localities, where the necessary material for lobster fishing is expensive and often hard to obtain, the benefits derived are very small. Owing to the present market conditions, fishermen get better results in cod fishing.

It is observed that the public interest is increasing regarding the protection of this fish. During the season there were ten prosecutions for illegal fishing in Magdalen Islands, and one in the county of Bonaventure.

HERRING.

Herring appeared on the 21st April in the Baie Plaisante and remained in normal quantity all around the islands during the month of May and the first days of June. The total catches there although less considerable than those of last year, were more than sufficient for the needs of smokehouses, as well as for the needs of cod and lobster fishing. As usual, they caught more than could be used. Foreign fishing boats, which come to the islands after bait, are becoming less and less numerous so that fresh herring is in less demand. The smoking industry, which started during the war, is being more and more expanded. From the number of new establishments which are built every year, one must conclude that those who are devoting themselves to the preparation of smoked herring are making large profits. In the counties of Bonaventure, Gaspé and Rimouski, herring is still used as fertilizer only, and as bait for lobster and cod fishing. In the county of Saguenay, it is rather scarce.

SALMON.

The production of salmon fisheries, which have been decreasing gradually for the last three years, is still falling off. Compared to that of the preceding season, the results of which were already bad, it shows a large decrease. This is due to the fact that in many localities the migration took place during the last days of July when the greater part of fishermen had stopped fishing. This late migration, which continued in August, was clearly demonstrated in Labrador where, at the beginning of the same month, a large number of salmon were caught in nets set for cod. I was informed by hunters, who visited certain rivers during the fall, that the spawning beds were full of parent salmon.

ANGLING WAS NOT A GREAT SUCCESS, EITHER.

SESSIONAL PAPER No. 40

The unsatisfactory results are also partly due to the absence of caplan in all the northern part of the gulf, and the presence of ice until July in Labrador.

Some rivers on the south shore of the St. Lawrence should be better protected than they are. From reports received, poaching is still going on in the rivers Cap Chat, Ste. Anne des Monts and Mont. Louis. I could not, however, obtain direct information to enable me to prosecute the poachers.

MACKEREL.

Mackerel, which is caught in the gulf division, comes from Magdalen Islands; the counties of Gaspé and Bonaventure only supply small quantities. This fishing has been practically nil in the county of Saguenay for many years. No interest is taken and they do not even have necessary equipment. However, there are good indications that mackerel will reappear on this coast as well as in Chaleurs bay, where it was formerly found in such large quantities.

The production of the current year is inferior to that of 1918 which gave a result smaller than that of the last four years. This failure can be explained by the fact that serious damages were sustained by a large number of mackerel nets through a storm; the fishing, which was only beginning and showing good results, had to be abandoned.

It must be acknowledged that the last season was very quiet in all the stations of the district. There was no disorder worth mentioning, except a few violations of the law already mentioned in Magdalen Islands and in the county of Bonaventure. I wish to state again that in this last locality there is practically no officer for the protection of lobsters. I was informed during the winter that there was some live lobster trade going on after the 26th June. Mr. G. T. Annett has been looking after this section for the last two years, but as he is living at Gaspé, i.e., 200 miles east of the county of Bonaventure, he cannot reasonably be aware of what is going on. I am of the opinion that a permanent fishery officer should be appointed for Bonaventure.

The number of licenses issued in 1919 was smaller than in 1918. The difference is due to the fact that many Newfoundlanders who, as usual went to Labrador for codfishing, were prevented from doing so by the ice which remained near the coast up to the end of July.

REPORT OF CHIEF INSPECTOR G. S. DAVIDSON, PRAIRIE
FISHERIES DIVISION, FOR THE YEAR 1919.

PROVINCE OF ALBERTA.

The district of northern Alberta shows a large increase in the catch of all kinds of fish, though the number of commercial and fishermen's licenses is not so large as in the year 1918. This increase may be attributed to the fact that the northern country is being rapidly settled, which means a larger demand for fish, the roads throughout the district improving greatly, enabling the fishermen to tap new lakes and to get their catch out of shipping points in good condition, increase in the number of dealers and improvement in their plants for the handling of the catch which allows of their handling more fish than formerly.

11 GEORGE V, A. 1920

In the district of southern Alberta, angling, which is the chief fishing, has fallen off greatly. The past summer was one of great drought in this district; many of the streams which in previous years carried sufficient water to make good trout streams, dried up, or became mere trickles of water. Many fish were lost in this way. A number of streams were closed by the department to all fishing for a period of two years. This I am sure will have a beneficial effect and lead to the natural restocking of those waters. Action has been taken to compel the screening of all irrigation ditches. This will, undoubtedly, save immense quantities of sporting fish. The commercial fisheries of this district are of very little importance, the Red Deer river being fished for coarse fish under fishermen's licenses, only seven licenses having been issued, the catch being one thousand pounds each of pickerel and suckers, all of which is used locally. During the year there were ten prosecutions for violations of the regulations, as follows:—

Fishing in Close Season.....	3
Fishing without license.....	1
Possession of undersized trout.....	3
Dynamiting streams.....	3

One case of obtaining license by false representation was noted. In this case the license was cancelled at once. The fishways are in good order. Reports made in connection with obstruction of streams by beaver-dams were investigated and it was found that in practically every case the obstructions were situated within forest reserves. The Southern Alberta Fishermen's Association was formed in Calgary, with which will be affiliated like associations in the southern district. The members of this association have given their assurance that they will co-operate with the department in every way to further the protection of the sporting fish. They have already made several valuable suggestions along this line which have been placed before the department.

PROVINCE OF SASKATCHEWAN.

In the northern portion of the province, there was a decrease in the quantity and value of fish taken, due to fewer fishermen operating in many districts, though in some districts there were more fishermen than in the preceding year, and in such districts, increased catches were obtained. Not only are no lakes showing signs of depletion, but the fish are improving in quality and size.

Developments in the fishing industry during the year include the erection of a large warehouse at Big river and a saw-mill at Dore lake, for the manufacture of fish boxes, building of new piers and wharves, and improvements in the roads leading to the lakes. Many fish camps have also been built to replace those destroyed last year by forest fires. The demand for frozen fish is growing and prices are firm. Local markets are well supplied and the surplus shipped to United States markets.

The district was well patrolled by an efficient staff of officers, and the close seasons have been well observed. There are officers residing at most points where saw-mills are operating, and no pollution of streams took place. All fishways are in good condition, and allow the free passage of fish at all seasons of the year.

In the district of southern Saskatchewan, the catch of whitefish in Lowes lake district is smaller than in the year 1918. This is accounted for by the overseer in charge, as owing to the strike in Winnipeg last summer, which stopped all shipments of fish, that being the chief market for the catch. Fish are as plentiful as in former years and there are no signs of depletion. It is reported that the whitefish have not spawned by the opening of the winter fishing season, December 15, the fish not having completed spawning until January 1. The same condition is observed in the Qu'Appelle lakes, and it would appear that a change in the date of the opening of the winter fishing season in these two districts would be beneficial.

SESSIONAL PAPER No. 40

The Qu'Appelle lakes and lake Katepwe have this season been administered under an overseer as one district; which has worked out to advantage. The stocking of these waters with whitefish from the Qu'Appelle hatchery is this year showing results, some fine whitefish having been taken. Owing to the whitefish coming to maturity this year a change in the mesh of nets used for fishing was made from $4\frac{1}{2}$ inches as used in previous years to $5\frac{1}{2}$ inches; this has resulted in a smaller catch of coarse fish and tullibee, and was not popular with the fishermen; but in my opinion was the proper course and should be continued. The catch is not so large as in the previous year but this may be put down to the use of the larger mesh. One hundred fishermen are shown as operating. Of these, sixty-six fished from January 1, 1919, to the end of the fishing season, and thirty-four from December 15 to December 31, 1919, so that during the latter period there were only about half as many fishing as there were last year, between the same dates. This would account for a smaller catch, the best catches being taken during the first two weeks of the season. A number of fishermen who last year fished the Qu'Appelle lakes are now fishing in Lowes lake, where they can take advantage of the summer fishing. This would account for the falling-off in the number of fishermen operating on the Qu'Appelle lakes at the present time. There are very few experienced fishermen on these lakes, a fact which tends to reduce the catch. There were four prosecutions in the southern district: three for fishing within twenty-five yards of the mouth of a fishway, one for selling fish taken under domestic license. An increase of four icehouses is noted at Lowes lake, also an increase in the number of row-boats and gasolene boats at the same lake, the fishermen adding to their gear, from year to year.

During the year 1919, I visited practically all the northern lakes and was gratified to find the great improvements in the methods of handling the catch. Every effort was being made to put the fish on the market in perfect condition. The sanitation of the plants was good, everything being kept clean and in good condition. Great attention was being paid to the proper cleaning of the fish, and all utensils were kept perfectly clean. I also met all the fish-dealers and had many discussions with them in connection with the different phases of the fish industry. I found them in nearly every case, ready and willing to do what was necessary towards the improvement of the industry and the preservation of fish. I am pleased to say that there was no waste of fish at all, though this particular point was under the closest scrutiny by officers on the ground.

PROVINCE OF MANITOBA.

During the year just ended, the fishery service in Manitoba suffered the loss of three of its officers: Inspector J. A. Howell, whose death occurred on June 3; Guardian D. S. Daly, who died on the 13th of May; and Special Guardian William Overton, who died on the 5th of September.

Fishing throughout the province was, on the whole, as good as the previous year. Owing to low water in the Saskatchewan river and tributary waters, summer fishing in the northern district was practically a failure.

In District No. 1, lake Winnipeg, 783 licenses were issued.

In District No. 2, which includes the whole of the province with the exception of lake Winnipeg, 1,341 licenses were issued.

Only one prosecution took place in District No. 1, while in District No. 2 there were eight.

There has been in the past a tendency on the part of the fishermen, and fish companies, to use a smaller mesh net than that prescribed by law, but under the new reorganization it is hoped to put an end to this corrupt practice.

11 GEORGE V

Much assistance was rendered by the members of the Royal Northwest Mounted Police, also by the provincial police of the provinces of Alberta and Saskatchewan, especially in those districts where conditions make it possible for guardians to visit only occasionally.

Taken on the whole the regulations were well observed when the area of the districts administered is considered.

The officers under my supervision, with very few exceptions, performed their duties in a satisfactory manner.

REPORT OF CHIEF INSPECTOR, LIEUT. COL. F. H. CUNNINGHAM,
WESTERN FISHERIES DIVISION (BRITISH COLUMBIA) FOR
THE YEAR, 1919.

Assistant Chief Inspector, J. A. Motherwell, Vancouver, B.C.; District No. 1—A. P. Halladay, New Westminster, B.C.; District No. 2—J. T. C. Williams, Prince Rupert, B.C.; District No. 3—E. G. Taylor, Nanaimo, B.C.

There was practically no change in the administrative and commercial aspect of the fisheries as compared with the previous year.

In District No. 3, three new canneries were in operation, one located at Sooke harbour and two on Barclay sound, one of these being erected for the purpose of canning herring, and subsequently the operations were extended to the canning of salmon.

The only administrative change was in the experimental direction of extending the areas over which purse seine licenses could operate, Knight inlet being the most important used in this direction. The result was satisfactory except that the licensees congregated at the most valuable fishing grounds, and it is quite possible that the fishing would have been too intensive at these places had it not been for the watchfulness of the fishery officers, who strictly enforced the regulations regarding fishing boundaries. To obviate this in future the fishing boundaries must be extended further from the mouths of the rivers, not with the intention of handicapping the operations but in pure fairness to both fish and fishermen.

The total pack of all varieties of salmon was 1,392,966 cases, as compared with 1,616,157 cases for the previous year. The decrease is largely due to the limitation in the packing of chum salmon, the decreased run of pink salmon owing to the disastrous freshets of 1917 which affected the spawning areas, and also to the necessity for the earlier annual close season on account of the unprecedented dry season. This early cessation of fishing affected the coho pack as the pink salmon had gathered around the mouths of the streams and were joined by the cohoes. If fishing operations had been allowed to continue it would have proved disastrous to both these species as in taking the cohoes, pinks would have been caught which had so deteriorated as to render them of no commercial value. This possibly was a hardship on both fishermen and cannerymen but it certainly was in the interests of conservation and will no doubt be realized in the run of 1921.

SESSIONAL PAPER No. 40

Returned Soldier Citizens.—Owing to the necessity for the re-establishment of returned soldiers in the various avocations of life it was necessary to change the fisheries policy in the northern part of the province to meet these conditions. Consequently the number of salmon gill-net licenses issued was increased, thus enabling all returned soldiers desirous of doing so to take part in the actual fishing. The statement at the end of this report gives the number of returned soldiers who took advantage of this opportunity. Whilst many of these returned men were inexperienced in fishing they received assistance and advice with the result that on the whole they were successful, not perhaps to the extent they anticipated but the exaggerated benefits they were led to believe would accrue from the fishing planted the foundation for greater expectations than were warranted. Whilst these expectations were not fulfilled the general results were satisfactory to them.

DISTRICT NO. 1, (FRASER RIVER.)

The total pack of the Fraser river watershed amounted to 158,628 cases, as against 206,003 cases for 1918. The pack of sockeye was 29,628 cases, which was small even for an off year. It is encouraging, however, to note that this variety was in excess of 1918 by 12,779 cases. The quantity of salmon exported other than sockeye was greatly in excess of the previous year.

There was a very heavy run of sockeye during the month of October after the close season for the use of $5\frac{3}{4}$ inch mesh nets. These sockeye entered the streams tributary to Pitt lake, including the Lillooet river, Gilley creek, Silver creek and the Upper Pitt river, and large numbers found their way to the Coquihalla river and Kawkawa lake, which is tributary to the Coquihalla. There was also a large run to Cultus and Chilliwack lakes. These fish reached the spawning grounds in good condition and good results should follow in 1923. Whilst this run was late in 1919 there is nothing to prove it will always be a late run and may come as an early run in the year they return to their spawning beds.

From an inspection of the spawning grounds in the lower Fraser river watershed it is evident that the number of cases packed cannot be used as a basis for estimation as to the number of the different varieties that actually reached the natural spawning grounds. It is also pleasing to note that there is an encouraging improvement in the run to the Shuswap lake areas.

The regulations were fairly well complied with and the enforcement of clause 80 of the Fisheries Act, whilst perhaps a drastic measure, has had a salutary effect in minimizing the number of violations as compared with the number of licenses issued. There were eight gasoline launches used in patrolling the district, five being owned by the department and three under charter.

The services rendered by the fishery officers were of an energetic nature, impartial and satisfactory.

DISTRICT NO. 2.

Skeena River.—The abnormal run of sockeye to this river fully demonstrates what has been stated in previous reports that little is known of the natural life-history of the salmon. Notwithstanding the evidence obtained by the Fisheries Commission of 1917, which was on the lines of a depletion of this variety, yet the run to this river was the greatest since 1913, and resulted in a pack of 184,945 cases of this very valuable variety.

The run of spring salmon in the river was not as good as in 1918 but it must be remembered that there is a considerable drain on this run before it reaches the river owing to the intensive operations of the trollers outside, which naturally decreased the run to the river itself.

11 GEORGE V, A. 1920

The run of pink salmon was not good but the run of 1918 was the heaviest experienced for many years and there is no doubt but that the unprecedented freshets of 1917 were responsible for this as they must have affected most seriously the spawning beds.

The operations of returned soldiers on the Skeena river were of necessity limited as it is a hazardous area to operate in owing to the tides and the rougher elements in Chatham sound, but experience at other places will be of great assistance to those soldier citizens desiring to operate this year on this river.

Naas River.—It is regrettable to have to report that the salmon fishery of this river needs special attention if the run is to be continued. I have already drawn the attention of the department to the operations of American traps outside Pearce canal, north along the Alaska coast to cape Fox. These traps were most successful in capturing salmon heading for the Naas river and unless some international arrangement is agreed upon whereby these salmon will receive proper protection whilst passing through international waters this river as a producer of salmon and as a commercial asset is in the opinion of the officers of the department doomed.

Portland canal, which used to carry great quantities of salmon previous to the operation of these traps, shows a great depletion, as also does Observatory inlet and Alice arm, and further, the reports of the special provincial and Dominion officers show practically no spawning fish on the grounds in Meziaden lake. It is certainly in the interests of both the American and Canadian industry that immediate action be taken to ameliorate this condition of affairs.

Rivers Inlet.—The total pack amounted to 80,367 cases, of which 56,258 cases were sockeye. The pack would indicate that the run of this species was poor but the actual fact is that the run was heavier than it has been for years. The reason given for this is that the fish were small and passed through the $5\frac{3}{4}$ inch mesh nets. Another reason advanced is that the fish swimming deep passed under the nets, and I am of the opinion that the latter is nearer the solution than the previous one. The spawning beds of Owekano lake carried more sockeye than for years past. In addition to the hatchery being filled to capacity the natural spawning beds were exceedingly well seeded.

Smiths Inlet.—The run of all varieties of salmon to this area shows an improvement and the reports of special officers inspecting the spawning beds indicate that they were well seeded.

Reference is made to the unfortunate action of gill-net fishermen in destroying the seines operated under license in Quashela creek. The license for this area has been in force ever since the cannery was erected, some twenty-five years ago, and whilst during the past four or five years it has been a bone of contention it must be remembered that it is only of comparatively recent date that sockeye have been caught by gill-nets in this inlet in paying quantities. The department had given sympathetic consideration to the contention of both the licensees and the fishermen, and the decision reached was that the licensees should be allowed to operate the seine for a limited number of days during the season of 1919, after which season the license would not be renewed. The gill-net fishermen, however, took matters into their own hands and destroyed the seines.

There is no doubt that the discontinuance of the license for this creek will be the means of building up the run of sockeye salmon in this area to its former condition, as owing to the phosphorescent nature of the water in the inlet it is not possible for any number of gill-nets to seriously affect the run of fish, hence it may be reasonably expected that Smiths inlet will resume its place as one of the most important areas for sockeye salmon.

SESSIONAL PAPER No. 40

Central Division.—This division includes Namu, Bella Bella and Gardner canal. The run of all varieties of salmon was fairly good, especially the run of what is known as "Creek" sockeye to the waters of the Bella Bella area. In this area the fall fish predominate and the operators must to a large extent depend upon these grades for their pack.

Bella Coola.—The run of all species of salmon was not good. The run of pink salmon was no doubt largely affected by the freshets of 1917, which were generally disastrous in this portion of the province. A number of returned soldier citizens have made their homes in Bella Coola on the land and depended upon the season's fishing to help them out. Consequently whilst it cannot be said they are discouraged still the results of their operations were not commensurate with their indefatigable efforts.

Queen Charlotte Islands.—On the east coast of these islands alternate runs of pinks and chums are usual; 1919 was the season for the latter variety and great quantities were caught and shipped in a green state to the Skeena river and south. The Moresby island fisheries also salted a large quantity. Returned soldier citizens hold the majority of the seining licenses in this area and on the whole their operations were successful.

Trolling.—The trolling industry is becoming more popular with the fishermen and there was a greater number of licenses issued than during the previous season, but the results were not so successful as in 1918 as spring salmon and cohoes were not so plentiful. This mode of fishing is receiving considerable attention from an economic standpoint. It is stated that quantities are hooked and lost and consequently die. It is also reported that spring salmon with large hooks imbedded in their mouths have been caught in gill-nets on the Skeena river. The American authorities are also considering the results of this style of fishing from a conservation standpoint. It is not fair to the fishermen that any value should be placed on rumours and it would be in the interests of all concerned if a reliable officer, who should if possible have scientific attainments, were placed for one season on the trolling grounds to report on conditions.

Halibut.—Prince Rupert is yearly growing in importance owing to this fishery. The fishermen operating out of this port had another successful year, the quantity, quality and price being maintained. Statistics will show that the catches were heavier than in 1918. The American catches and deliveries were far in excess of those from Canadian sources. Between five and six hundred carloads of Canadian and American halibut were shipped over the Grand Trunk Pacific railroad during the year, and it is stated that Prince Rupert will in a few years be the most important depot for halibut on the Pacific coast.

The international arrangement covering a close season for halibut should by the protection afforded materially assist in keeping up the supply of this species and enable Prince Rupert to take a foremost place as a distributing point of the halibut fishery.

Herring.—There is not much to be said on the herring fishery of this district as they are taken mainly for bait purposes. The Japanese make a success of this fishery by dry-salting and shipping to the Orient, whilst the white fishermen, owing to conditions, are not able to compete successfully. Halibut fishermen have in the past complained bitterly as to the lack of bait but this has been partially overcome by the establishment of herring pounds in the vicinity of Prince Rupert. During 1919 one or two were operated successfully and the number will be increased for 1920.

Protection.—During the season of 1919 conditions were such that it was possible to give a greater protection to the fisheries of this district. The steamer *Thomas Crosby* was again chartered. The department owns seven fair-sized gasoline boats and there were also twelve other boats under charter manned by officers who gave satisfactory service.

11 GEORGE V, A. 1920

DISTRICT NO. 3.

This district includes no sockeye areas of any great importance. The principal ones are a small run to Anderson lake through the waters of Barclay sound, to Kennedy lake through Clayoquot sound, also to Sauch-en-auch creek and Knight inlet, the most extensive sockeye river being the Nimpkish opposite Alert bay. The operators must therefore rely very largely on the fall fish for their packs. The run of sockeye to the Nimpkish river showed a great improvement over 1918 and conditions there are generally satisfactory.

The run of pink salmon over the whole district was small and whilst this was the off year for this variety in many places in the district the run was even smaller than expected, attributable no doubt to the 1917 freshets already referred to.

Reference must be made to the fishing conditions on the west coast of Vancouver island covering the area from cape Beale to Sombrio point. There were twenty-nine purse-seine licenses operating in this area of which fifteen were issued to returned soldier citizens. These men were not in a financial position to supply themselves with boats and nets consequently they had to make the best arrangements possible with those owning the necessary gear to operate their licenses. Whilst it is possible the best arrangements were made by them under the circumstances, still the conditions were not satisfactory and led to such intensive fishing that practically no salmon (chums) reached their spawning beds. This is a serious state of affairs as it means the cycle has been broken and the corresponding run of the 1919 fry will be practically nil. The aggregate catch was a fairly large one, but from an economic standpoint were of no value to Canada as the bulk of them were shipped in a green state to be canned in the United States.

To Barclay sound there was a tremendous run of dog salmon and from this quarter large quantities were also exported.

The run of sockeye to Anderson lake was fair and the run to the Somass river shows a decided improvement as during the past few years these fish have not been molested to any great extent. The cannery owned by the western packers and located at Shushartie was not operated this season, it being the object of the owners to allow all of the pink salmon to reach the spawning beds, and thus, if possible, build up a good annual run improving present conditions of a good run only every other year.

There was an increase in the number of purse-seines operated, all by returned soldiers, and whilst the returns may not have reached expectations they were in the majority of cases satisfactory.

There is nothing of special interest to report in connection with this district except in connection with trolling. This mode of fishing is on the increase and many complaints are received that in the early part of the season very small fish of the spring and blueback variety are to be found on the market. It is practically impossible to enforce any suggested regulation covering this unless all trolling is prohibited until later in the season. If this action is taken it prevents the capture of the early run of spring salmon which are most valuable as a commercial commodity. It has been suggested that only a certain sized hook should be used for the earlier months of the season which would prevent the capture of small fish, but such a regulation could not be enforced as it would mean placing an officer on every trolling boat to prove of any value. The suggestion already made of an officer with scientific attainments to investigate this mode of fishing would be most valuable.

Herring.—There has been a very large run of herring all over the district and some 30,000 cases have been canned in Barclay sound. Owing to market conditions the output of "Scotch cured" herring has been greatly limited as it is impossible to compete commercially with the product of the British Isles, and until transportation rates and labour conditions again become normal the

SESSIONAL PAPER No. 40

outlook for this business is not good. There has, however, been a great impetus this season in the business of dry-salting, the increase being 138,870 cwts., which finds its way to the Orient. This business should be fostered and to keep up the quality all shipments should be inspected before leaving the country. It is also to be recorded that there is an increase in direct shipments by British subjects, which is satisfactory to the trade.

Reduction Works.—There appears to be a satisfactory increase in the manufacture of by-products, and whilst several oileries were established during the war and the product of oil received a ready sale this condition maintains in peace times even to a greater extent as the operations have generally improved and the whole dogfish is now being utilized for oil and for the manufacture of cattle and chicken food. Each establishment erected is an improvement on the last and there is no doubt but that these factories will be extended to cover the production of other products, such as the conversion of sharks, hair seals, sea lions and porpoises for commercial purposes.

As in other districts it was possible to increase and extend the protection service and it is pleasing to note that the infractions of the regulations are limited.

REMOVAL OF OBSTRUCTIONS.

Approximately \$30,000 was expended in connection with this important work. Over \$6,000 was spent in cleaning out streams tributary to Owekano lake, and which from reports of inspection subsequently made have been of great value in enabling the parent fish to reach their natural spawning grounds. Other important work was performed on Black creek, Rosewall creek, Cooks creek, Big Qualicum river, Nahwitti river, Okis Hollow creek, Coquihalla river and the Yakoun river, on Queen Charlotte Islands. Obstructions were also removed from smaller creeks. All of the places mentioned are now practically clear to the free access of salmon.

Work of this nature has its difficulties owing to the isolated locations and the necessity for transportation of men, material and provisions by special boats. A great deal of this work was necessary owing to the carelessness of loggers in not removing debris from the creeks when their work was completed and which formed the nucleus of obstructions, time and nature doing the rest. There is hardly a creek up which salmon go to spawn but which requires attention caused either by natural or logging operations. It is considered that a continuation of this class of work would be of immense value to the fishing industry.

Engineer McHugh has been indefatigable in his efforts to personally supervise this work as much as possible, but owing to the absolute necessity for his personal supervision of most of the work in connection with the construction of the Lakelse hatchery he was not able to give so much of his personal time to the removal of obstructions as could be wished. He has been given the assistance of a most efficient assistant who was able to give a good deal of the work personal supervision.

The general impression of those interested in the industry and in the perpetuation of the salmon as a continued commercial asset is that this work should be proceeded with as expeditiously as possible. This is being done, but it must be remembered that the amount of work to be accomplished is limited by natural conditions but the department and its officers realize the value of a clear waterway to the parent fish in reaching their spawning grounds and no opportunity will be lost in pushing the work as rapidly as the appropriation and other conditions will permit.

The fishery overseers have been instructed to keep a close supervision over the streams at the time the salmon are running in order to determine more definitely the seriousness of alleged obstructions, and they will also on streams which have been cleared see that the nucleus of any new obstructions is immediately removed. The labour used in this work was composed of practically all returned soldiers.

11 GEORGE V, A. 1920

FISH CULTURE.

This is a very interesting topic at the present time when the value of this work is being criticised in some quarters. It appears to the undersigned that if these critics devoted the same energy in the direction of conservation that they do in condemning the actions of the department the fish hatcheries would become even of greater value than they are as they would be able to turn out a greater number of fry owing to the fact that there would be more parent fish on the spawning beds which Nature would take care of and the hatcheries would take care of the surplus eggs.

During the past season of 1919 there were five hatcheries operating on the Fraser river watershed, two on Skeena river, one on Rivers inlet, three on Vancouver island and one at Gerrard. Nine of these are devoted exclusively to the incubation of salmon eggs, the Cowichan lake hatchery partially so, while the Gerrard hatchery is a trout hatchery. The total distribution of sockeye fry during the spring of 1919 in the

Fraser river watershed was.....	34,100,000
Skeena river watershed.....	8,000,000
Rivers inlet.....	3,000,000
and on Vancouver island.....	4,606,550

In addition to this there was the usual number of spring, coho, hump-back and chum salmon fry distributed.

Good progress is being made in the construction of artificial rearing ponds in connection with the various hatcheries where the geographical situation will permit of this being done. Another improvement is the distribution of fry as much as possible on the natural spawning beds. At the Cowichan Lake hatchery the value of such rearing ponds has been demonstrated, thousands of spring salmon having been released after attaining a size of over two inches in length. There is no question but better results are assured by the liberation of fish having reached this size as they are stronger and in a better condition for self-preservation than the fry where the sac has only just been absorbed.

The officer in charge of the Harrison Lake hatchery has for the past two or three seasons been experimenting in the hatching of fish eggs by the gravel method. This system is not generally understood by the public but for information generally the procedure consists of placing fairly large stones in the bottom of a prepared box or can. A certain quantity of eggs are then placed in the receptacle, the eggs finding their way into the crevices between the stones. Smaller stones are then added, more eggs are placed in the receptacle filling up the newly-formed crevices and this is continued until as many eggs have been deposited as is considered desirable. A supply of water is arranged for by a space left in the box for this purpose and it finds its way through the larger stones at the bottom of the box, working up through the gravel and escaping at the top, thus keeping the eggs constantly damp. Eggs incubated by this means do not appear to fungus and when the fry are hatched out, the sac absorbed, the young fish then feed on the infertile eggs which may remain in the gravel. It is claimed that fry hatched out by this means retain to a greater extent wilder habits than those which are hatched in the open troughs in the hatcheries it being further claimed that hatchery fry become accustomed to their surroundings and lose a certain amount of that wild instinct which the gravel-hatched fry retain. It is very questionable if there is such a great difference in this respect as between the fry hatched out by the different systems—self-preservation is the first instinct of nature and unless the fry are kept sufficiently long to accustom them to artificial feeding it is difficult to conceive that the natural wild instinct should be lost in such a short time. However, fish culture, like everything else, is open to improvement and the system of gravel hatching will be extended and if it proves a more successful means of increasing the supply of fish than the present method it will certainly be adopted.

SESSIONAL PAPER No. 40

I would like to refer here to the work of Mr. Alexander Robertson, officer in charge of the Harrison lake hatchery, who has been untiring in his efforts whilst an officer of the department to in all cases improve the present system of fish incubation, and he is deserving of great credit for the success he has met with. He has proved even with present experiments that the gravel system is a successful one and this system can be used to great advantage in stocking streams where the supply of parent fish is being depleted and where it is practically impossible to build a hatchery, or in isolated places to which the fry cannot be transported. The eggs can be taken there and incubation completed by the gravel system.

It is unfortunate that the hatchery operations should be the subject of the present criticism, especially by opponents who it is doubtful have ever been in close touch with the operations of a fish hatchery and who know little if anything of the procedure. They air their views in the press and because they may be interested in the canning business their views are accepted by the general public for this reason only, and the experience of men who have given their lives to the work of fish culture both in this and other countries has no value.

In a recent report to the New Westminster Board of Trade it was stated that the Harrison lake hatchery was blamed by many experienced fishermen for the depletion of this run, but the facts are that the only portions of the Fraser river watershed carrying a supply of parent salmon this year are where hatcheries are located. The run of sockeye to Morris creek, a tributary of the Harrison river, is increasing every year. The run of Sockeye to the Birkenhead river, a tributary of the Lillooet river was phenomenal. Why? Because of the output of fry from the Pemberton hatchery in 1915. The Coquihalla was not a sockeye river until fry were placed there from one of the hatcheries, the result being that this year shows an estimate of 75,000 parent fish on the spawning grounds.

Some resolutions state that the hatcheries are a failure and yet the same resolutions blame the hatcheries for the run of small fish. There are small fish and large fish as the results of nature, so if the hatcheries are responsible for small fish they must also be given credit for large fish as well as it does not seem possible that only small fish would be the result of hatchery operations.

When one considers that the sockeye heading for the Fraser river are preyed upon by the traps in Juan de Fuca strait, the seines and traps in international waters miles of gill-nets for fifty miles of the Fraser river to Mission bridge, above Mission bridge by Indians and settlers, it is a miracle that there are as many fish coming to the Fraser river watershed as there are to-day, and it will be conceded by impartial judgment that the hatcheries are responsible to a large extent for the present although somewhat limited supply.

It is quite possible the system may be improved upon and every effort is being made to assist nature, but nature must also be assisted by those interested in the commercial life of the industry by allowing a sufficient quantity of parent salmon to reach the spawning grounds for the purpose of reproduction.

The resultant fry obtaining from the shipment of Alaska sockeye eggs transferred to the Harrison lake hatchery turned out very satisfactory. Fifteen millions of this variety were distributed in the various creeks emptying into Harrison lake. The fry were released as far up the creeks as it was possible to travel, thus placing them on or near the natural spawning grounds. Approximately a million and a half of the fry were held in the hatchery retaining ponds and troughs and attained a good size before passing into the lake. The fry when distributed were strong and hardy, and the shipment of eggs, the incubation and the liberation of the fry was a decided success.

11 GEORGE V, A. 1921

REVENUE.

For several seasons past consideration has been given to the desirability of providing for an increased revenue more commensurate with the commercial value of the fisheries of this province. For the season of 1919 the license fees were increased as follows:—

Salmon cannery	licenses from	\$50. to \$500.
" purse-seine	"	\$75. to \$300.
" drag-seine	"	\$50. to \$150.
" trap-net	"	\$75. to \$500.
" gill-net	"	\$ 5. to \$ 10.

In addition to the above one-half cent per fish was collected on all salmon caught by purse- or drag-seines. A fee per case of canned salmon containing forty-eight pounds was also levied at 4 cents a case for sockeye and 3 cents per case for all other varieties. These fees, together with the amounts received for fines and the sale of confiscated articles, reached a total of \$253,997.60.

For the purpose of revenue collection the province was divided into two areas,—

- (1) The Fraser river, Howe sound, Vancouver island and the mainland adjacent thereto;
- (2) All waters north of cape Caution extending to the boundary line in Portland canal.

Owing to the vast area over which fishing operations are conducted the collectors had a great deal of travelling and detailed work to arrange for, but I am pleased to say they performed their duties in an efficient manner and for a first season the enforcement of the new revenue regulations was most satisfactory.

GENERAL REMARKS.

The desire of the returned soldier citizen to participate to a greater extent in the commercial industry created a difficulty in connection with the increase of the number of purse-seine licenses. It was felt that in the interests of conservation there were already sufficient, intensive fishing operations being conducted that the run of the various species of salmon could maintain, but it was also felt that the conditions warranted a greater encroachment on nature's supply, hence forty-six salmon purse-seine and drag-seine licenses were granted to returned soldiers only during the year. There were 150 applications and it could be well understood that the forty-six successful applicants could not be decided upon without creating great dissatisfaction amongst those who were unsuccessful. Whilst there may have been one or two licensees who did not fill expectations it was generally conceded that the best possible had been done considering the great number of applications and the small number of locations available.

Very few, if any, of these men had the financial means to operate their licenses and if they are to be encouraged in the direction of fishing as a means of earning a livelihood they must be given some financial assistance by the Government on the same basis as returned soldier citizens desiring to enter other fields of activity. Until this is done there must of necessity be a bartering in licenses which will not lead in the direction of building up a white fishing industry but will tend to place the actual operations of the licenses in the hands of others than the licensees. A white fishing population is desirable and this does not mean a fisherman who will fish for a few months during the salmon run but one who will follow the fishing the year round in the different seasons, viz., salmon, herring, halibut and cod, thus providing employment for the whole year and building up a thrifty and prosperous white fishing population.

During the season of 1919 a judicial investigation was held into the actions of the fishery officers in District No. 3. Charges of all kinds were filed against the officers and his Honour Judge Eberts was appointed by the Government to investigate the same. All evidence was taken under oath and it is satisfactory

SESSIONAL PAPER No. 40

to note that not one solitary charge was proven, but it was an unfortunate waste of time and public money. One good feature, however, may have emanated from the investigation in so far as it set at rest in the public mind wild rumours of graft and maladministration of the fisheries in this province generally.

Attention is called to the large exportation of raw material in fish from this province to the United States. Such exportation is not in my opinion in the interests of the country as a whole. The manufacture of this raw material in Canada would result in a greater opening for labour and the distribution of money generally and would be a very strong factor in the procuring of foreign markets. Our competitors to the south have a very large home market for their canned goods and it is very questionable if the raw material were not obtained from Canada whether these foreign markets could be retained by them. It is claimed by the fishermen that an embargo on exportation would mean smaller results to them. This remains to be proved, as the manufacture of the raw material at home would mean the erection of new plants by foreign capital who would enter into competition with those already in the business, in buying fish, a greater competition amongst those now in the business which would be enabled by increased foreign trade, so that in my opinion the province and the Dominion has everything to gain and nothing to lose in manufacturing the raw products at home.

Whilst the manufacture of by-products is on the increase there is a wide field for extended operations. In certain localities there are large quantities of sharks, sea-lions, hair seals and porpoises, all of which can be used in the manufacture of leather and oil. The demand for these finished products is great, as is also the demand for chicken and cattle food manufactured at these establishments a growing one, and the field opens wide possibilities for enterprise.

The waters abound with all varieties of flatfish which are of great value as a palatable and nutritious food. This is another field open for enterprise and which should receive the special attention of the newly formed Publicity and Marketing Branch of the department.

In closing I wish to refer to the good work done by the Fisheries patrol steamer *Givenchy*, commanded by Captain Laird. This boat was one of the trawlers brought from the Atlantic coast and utilized in the Fisheries patrol service of this province. She is a most seaworthy boat and eminently suitable for work on this coast, and replaced the Fisheries patrol launch *Fispa*, which was transferred for service in District No. 3 under Inspector E. G. Taylor, replacing the *Alcedo*, sold by public auction.

The headquarters of the Dominion Fisheries Service were transferred in the beginning of the year from New Westminster to Vancouver. This transfer was only decided upon by the department after mature deliberation as the fisheries of British Columbia had been for so long associated with the Fraser river that there was a strong sympathetic feeling, but as the lines of progress had to be maintained there was no alternative and the transfer was subsequently authorized. The office is now installed in the Rogers block, a most up-to-date building on Granville street. The offices are commodious and a great convenience to both the staff and the public.

The past year has been a very strenuous one from the standpoint of the staff at headquarters and in the various districts. One and all have given the best of their ability to the service, great credit being due the district inspectors and fishery overseers generally for the satisfactory manner and willingness in which their duties were performed at all times, and it is to be regretted that the remuneration as provided by the Civil Service Commission is not more in keeping with the services required from these men and the responsibilities placed on them.

APPEN

NATURAL HIS

The following subjects are treated of:—

Lobster observations made at coasts of the Bay of Fundy, N.B., and at Investigations into the condition of the scallop at Mahone bay, N.S.

Remarks on the metamorphosis of the scallop.

Identification of a collection of specimens from Hudson bay waters, received

The following tabulation of measurements of lobsters is adjusted so that together with dates when the catches were made, can be seen at a glance.

A tabulation of Lobster measurements based on observa

1919.	St. Martins—13th May.			Mispec—19th May.			*Big Wood Island—28th May.		
Inches.	Males.	Females.	Totals.	Males.	Females.	Totals.	Males.	Females.	Totals.
6.									
6 ¹ / ₂ .									
6 ³ / ₄ .									
7.									
7 ¹ / ₂ .									
7 ³ / ₄ .	1		1		1	1			
7 ¹ / ₂ .		1	1	2		2			
8.							1	1	2
8 ¹ / ₂ .		1	1	1	4	5	2	1	3
8 ³ / ₄ .	2		2	3	5	8	2		2
8 ¹ / ₂ .				3	2	5	1	2	3
9.		3	3	1	5	6	5	3	8
9 ¹ / ₂ .		2	2	5	5	10	3	3	6
9 ³ / ₄ .		1	1	7	4	11	3	1	4
9 ¹ / ₂ .	1	1	2	4		4	7	3	10
10.		1	1		2	2	3	4	7
10 ¹ / ₂ .	3	3	6				5	2	7
10 ³ / ₄ .	2	1	3				4	1	5
10 ¹ / ₂ .		1	1		1	1		1	1
11.							3		3
11 ¹ / ₂ .	3	2	5					3	3
11 ³ / ₄ .	2	2	4		1	1	1	1	2
11 ¹ / ₂ .	2	1	3				1		1
12.	1		1				2	1	3
12 ¹ / ₂ .	1	1	2				1		1
12 ³ / ₄ .		3	3	1		1		1	1
12 ¹ / ₂ .	2		2						
13.	2		2						
13 ¹ / ₂ .	1	1	2						
13 ³ / ₄ .	1		1						
13 ¹ / ₂ .									
14.	1	2	3						
14 ¹ / ₂ .	1		1						
14 ³ / ₄ .				1		1			
15.		1	1				1	1	2
15 ¹ / ₂ .				1		1			
15 ³ / ₄ .		1	1						
	26	29	55	29	30	59	45	29	74

*1 mutilated male, which could not be measured, may be added—46 males.
Mutilated male added—75 lobsters.

[illegible]

11 GEORGE V, A. 1921

The following denotes a catch, made on July 14, at Entry island, which was placed for a limited time at my disposal for examination before it was conveyed across the channel to Savage's cannery at Havre Aubert, Amherst island:—

64 males, 80 females = 144 lobsters.
 Weight of males—69 lbs.
 Weight of females—61 lbs. Total—130 lbs.

The Havre Aubert and Entry island catches were practically from the same water areas.

There were no seed-lobsters among the females in any of the catches in the Bay of Fundy. The following shows the condition of the eggs of seed-lobsters, and of lobsters with the eggs just hatched off the swimmerets at the Magdalen Islands:—

Havre Aubert, July 2—

90 females—2 with eggs hatched off.....	1, 9 in.....	eggs hatched off.
	1, 10 $\frac{3}{4}$ in.....	eggs just hatched off.
	—	
	2	

Entry Island, July 4—

59 females—6 seed lobsters.....	2, 9 in.....	eggs not ripe.
	1, 9 $\frac{1}{2}$ in.....	eggs almost ripe.
	2, 10 in.....	eggs not ripe.
	1, 10 $\frac{1}{2}$ in.....	eggs not ripe.
	—	
	6	

Entry Island, July 9—

32 females—5 seed lobsters.....	1, 9 in.....	eggs almost ripe.
	1, 9 $\frac{1}{2}$ in.....	eggs not ripe.
	2, 10 $\frac{1}{2}$ in.....	eggs not ripe.
	1, 11 in.....	eggs almost ripe.
	—	
	5	

Entry Island, July 14—

32 females—9 seed lobsters.....	1, 9 in.....	eggs hatching.
	2, 9 $\frac{1}{2}$ in.....	eggs not ripe.
	1, 9 $\frac{3}{4}$ in.....	eggs ripe.
	1, 10 in.....	eggs nearly hatched off.
	1, 10 $\frac{1}{4}$ in.....	eggs hatching.
	1, 10 $\frac{1}{2}$ in.....	eggs hatching.
	1, 10 $\frac{3}{4}$ in.....	eggs hatching.
	1, 11 $\frac{1}{4}$ in.....	eggs ripe.
	—	
	9	

Entry Island, July 14—

80 females—1 seed lobster	1, 10 $\frac{1}{4}$ in.....	eggs nearly hatched off.
---------------------------------	-----------------------------	--------------------------

There may be a question concerning the seed-lobsters in the first and the last given of the above. The former was made at the wharf of the cannery after the catch had been brought in, and I found two females with the eggs recently hatched off, but Mr. Savage could not absolutely assure me concerning the release of seed-lobsters; and the latter, as mentioned above, was examined just before being conveyed across the channel, and whilst I found a lobster in the catch with the eggs nearly hatched off, I was again unable to ascertain whether or not any seed-lobsters had been released. Cannerymen at the Magdalens will not knowingly receive seed-lobsters, therefore, possibly there were some released before the catches were brought in. This question is raised because by eliminating the two catches where there is doubt as to whether any seed-lobsters were released or not, the percentage of seed-lobsters among the females rises from about 7.9 to about 16.3. In other words, 23 seed lobsters (and the two with the eggs recently hatched off are included in them) in 293 females approximate 7.9, whilst 20 seed-lobsters in 123 females approximate 16.3.

SESSIONAL PAPER No. 40

The following tabulation affords a comparison between the full-length and carapace measurements of 29 of the males, and 2 of the females in the Big Wood island catch. There were, as shown above, 46 males and 29 females, making a total of 75 lobsters in this catch. I seized an opportunity against the setting of the sun, and the holding of a campaign meeting in the school-house that night, to make those carapace measurements, but was unable to make carapace measurements of all the lobsters, and had, therefore, to desist in order to complete the full-length measurements of the balance. These measurements, however, were made very carefully, and, as a check on their exactness, with the help of a fisherman. My motive in making them was to establish a standard for the full-length and carapace measurements of the different sized lobsters.

The tabulation referred to here follows:—

Carapace.		Full Length—inches.							
Males.....	3 $\frac{3}{4}$ in.	8							1
	4	8 $\frac{1}{2}$							1
	4 $\frac{1}{4}$	9	9	9	9 $\frac{1}{4}$				4
	4 $\frac{1}{2}$	9	9 $\frac{1}{2}$	9 $\frac{3}{4}$	9 $\frac{3}{4}$	9 $\frac{3}{4}$	9 $\frac{3}{4}$	10 $\frac{1}{4}$	7
	4 $\frac{3}{4}$	10	10 $\frac{1}{4}$	10 $\frac{1}{4}$	10 $\frac{1}{4}$	10 $\frac{1}{2}$	10 $\frac{1}{2}$		6
	5	10 $\frac{1}{2}$	10 $\frac{1}{2}$	11					3
	5 $\frac{1}{4}$	11	11 $\frac{1}{2}$						2
	5 $\frac{1}{2}$	11 $\frac{3}{4}$							1
	5 $\frac{3}{4}$	12	12	12 $\frac{1}{4}$					3
	7 $\frac{1}{4}$	15							1
									29
Females.....	5 in.	10 $\frac{3}{4}$							1
	6 $\frac{3}{4}$	15							1
									2

During the summer I devoted considerable time to an investigation into the condition of the scallop at Mahone bay, Lunenburg county, N.S., as it had been reported to the department that the scallop fishery, owing to the heavy drain upon it was on the verge of being depleted. Reports of mine, placed on file, show what my findings were, and my recommendations for the conservation of that local industry, and I understand that the question of its proper protection is at present under consideration. The tenor of my reports (barring its use for catering purposes during the tourist season) emphasized the urgency of a rest for the scallop, in order to maintain the resource at its full productivity. My investigations were industrial (that is, they were carried on in the direct interests of commerce) and studies in natural history; and concerning the latter the following article already published in an issue of the "Canadian Field Naturalist" is here reproduced, under the title, "REMARKS ON THE METAMORPHOSIS OF THE SCALLOP (*Pecten tenuicostatus*)."

The scallop undergoes a metamorphosis. After hatching out, the young scallops attach themselves to rocks, scallop shells, or other objects, to which they remain as fixtures for a year or two. I can tell this from numerous young specimens obtained which possess an aperture through which a portion of the creature protrudes for attachment, and from a few specimens I came across which possess an elastic byssus for attachment, which protrudes from the so-called foot, and also from the margins of growth, the striations, and other points of structure which undergo a modification.

In the earlier stages the byssal attachment appears to agree with that of *Anomia* throughout the life-history of that genus. That is there is an aperture near the apex of the under valve through which a portion of the mollusk itself protrudes, so that it is directly attached to the object. But its agreement with *Anomia* in this respect is only temporary, for in time the scallop develops a byssus which is of elastic constituency such as the mussel (*Mytilus*) possesses

11 GEORGE V, A. 1921

throughout its life-history. In the instance of the scallop again this provision is only temporary, for in time as it continues to grow, the byssus disappears, and the scallop is free and can then move about by the flapping of its valves.

Sometimes I was able to determine a stage of development from a single example. For instance, the fact that at one time in its life history the scallop develops an elastic byssus secreted from the foot for attachment to an external object. Two other specimens of the same character were obtained, but the byssus of one of them had been broken off in the raking, and it was found lying loose, and the other, a much smaller one, was also detached from the object.

Considering that the byssus always occurs on the same side of the scallop, and that the aperture of the more immature form extends to the margin of the valve, it is evident that the elastic elongation simply evolves from the original attachment, and that the aperture of the under valve as it becomes obliterated, leaves the scallop, except that it is now moored to an external object, otherwise free.

Judging from an illustration from Parker and Haswell, these zoologists seem to regard the pectens as hermaphrodite, as they show one part of the gonad in the same individual as male, and the other as female. But this is not so, at least in the case of the scallop. The sexes are distinct, and out of 209 scallops specially examined by me in my observational work, 100 were males, 108 females, and in one the sex was indeterminable. The gonad of this last mentioned was completely empty, not that I consider the scallop had spawned, for it was impoverished generally, and apparently in a sickly condition. I might have been able, had I known it at the time, to determine the sex by the digestive organs, but this was a later discovery. This fact, however, helps to emphasize what I say as to the sexes being distinct. The gonad of the male is cream coloured, and the stomach and its appendages grey, whereas the gonad of the female is a sort of brick red colour, and the stomach and its appendages brown.

The following is a list of the specimens of fishes and invertebrates collected in Hudson bay waters in 1919, with the localities where they were collected, and on what dates, by Rev. W. G. Walton, missionary at Fort George, P.Q. After examination the specimens were transferred to Dr. A. G. Huntsman of the Biological Department, University of Toronto.

Sand Lance (*Ammodytus americanus*)—two specimens, Long Point, 15 miles east of cape Jones, August 5.

Capelin (*Mallotus villosus*)—One specimen, Long Point, 15 miles east of cape Jones, August 3.

Daddy Sculpin (*Myoxocephalus groenlandicus*)—Two specimens, Long Point, 15 miles east of cape Jones, August 5.

Long-horned Sculpin (*Oncocottus hexacornis*)—One specimen, Long Point, 15 miles east of cape Jones, August 5.

Common Stickleback (*Gastrosteus aculeatus*)—Fifteen specimens, near Great Whale river, July 26. Two sea-urchins in same wrapping.

Nine-spined Stickleback (*Pygosteus pungitius*)—Two specimens, lake near Great Whale river, July 26.

Common Stickleback (*Gastrosteus aculeatus*)—two specimens, Fort George river, James bay, September 8, ten young cyprinoids in same phial.

Greenland Codfish (*Gadus ogac*)—two specimens, Great Whale river, July 20.

Daddy Sculpin (*Myoxocephalus groenlandicus*)—Male, Great Whale river, July 22; male, Long Point, 15 miles east of cape Jones, August 3; female, Great Whale river, July 20.

SESSIONAL PAPER No. 40

Long-horned Sculpin (*Oncocottus hexacornis*)—Female, Great Whale river, July 25. A stickleback in same wrapping.

Arctic Charrs, presumable varieties of the European Charr (*Salvelinus alpinus*)—Two specimens, Great Whale river, July 25; 2 specimens, Long Point, 15 miles east of cape Jones, August 1 and 2.

Round Whitefish (*Coregonus quadrilateralis*)—Three specimens, Great Whale river, July 22; 1 specimen, Long Point, 15 miles east of cape Jones, August 4.

Starfish (*Crossaster*) Great Whale river, July 25.

Starfish (*Asterias*) near Great Whale river, July 20.

Starfish (*Asterias*) Long Point, August 4, Amphipod in same wrapping.

Starfish (*Urasterias*) near Great Whale river, July 20.

Sea Cucumber (*Cucumaria*)—Two specimens, Long Point, August 4.

Amphipod—(Two specimens, and alcyonarian (*Alcyonium*)—10 miles northwest of Great Whale river, July 12. Caddis-fly tube (fresh water) in same phial

Invertebrates found loose among the material without labels or data:—

Two sea-urchins (*Strongylocentrotus drobachiensis*) one mussel (*Mytilus edulis*), and 3 crabs (*Hyas coarctatus*), 2 males and 1 female.

The following is quoted from my letter to Dr. Huntsman, when forwarding the specimens: "The Arctic charrs and the whitefish are not in good condition, but I regard the former as varieties of "*Salvelinus alpinus*", and the latter, having neither the form of *Coregonus clupeiformis*, nor the teeth of *C. Labradoricus* I provisionally regard as *C. quadrilateralis*. Until some of the Arctic salmonoids can be received in a fresh condition, it is hard to be certain of some specific differences. Of all our fishes the whitefishes are more involved in distinctions of varieties than are those of almost any other group, and I sometimes question that some are entitled to specific rank."

The following is quoted from Dr. Huntsman's letter to me when acknowledging receipt of the specimens:—

"The fishes seem to be quite interesting. So far as I have examined them up to the present, the sticklebacks appear to be the form which is only partly mailed, that is the one called *curieri* by Jordan and Evermann. The white fishes seem to belong to two different species, but I have not yet gone into them very closely."

Mention may also here be made of a specimen of the spring salmon from the Pacific coast, which was sent by Mr. R. C. W. Lett, Industrial and Colonization Agent, Winnipeg, for identification; and the following is quoted from my letter to him in identifying it:—

"It is a specimen of the quinnat, otherwise known as the spring salmon, or king salmon. It frequents both coasts of the Pacific and their slopes, and ranges from California to Behring straits and China, and ascends the large streams from the sea, sometimes making its way to great distances. It is, therefore, anadromous, and attains a length of from two to five feet."

A specimen also of the so-called mud-minnow (*Umbra limi*) was received from the provincial fishery officer of Arden, Ont., for identification, and a note descriptive of it and of the other species of *Umbra* is on file; and Overseer Torrie sent a specimen of a lobster, coloured blue, which was found at Little river, Digby county, N.S. The blue colour, as was to be expected, has since faded in the preservative fluid.

11 GEORGE V, A. 1921

APPENDIX 3.

List of United States Fishing Vessels which entered Canadian Ports on the Atlantic Coast during the year ended December 31, 1919.

Name of Vessel.	Tonnage.	Number of Men in Crew.	Number of Times Entered.
Acushla.....	70	23	4
Agnes.....	65	19	2
Albatross.....	167	32	4
Alice A. Wilson.....	16	8	6
Angeline C. Nunan.....	58	16	5
Angie B. Watson.....	36	14	2
Annie Belle.....	37	7	1
Annie M. Parker.....	100	20	2
Arethusa.....	88	25	4
Arthur James.....	99	20	2
Athlete.....	96	10	3
Authentic.....	250	30	1
Avalon.....	69	19	2
Bay State.....	81	25	8
Benjamin A. Smith.....	75	25	8
Bettina.....	120	17	2
Blanche F. Irving.....	14	7	3
Catherine.....	103	26	4
Catherine Burke.....	92	23	6
Cavalier.....	96	20	4
Commonwealth.....	93	21	4
Constellation.....	89	19	5
Corinthian.....	89	26	7
Corsair.....	71	17	1
Dawn.....	79	21	1
Desire.....	21	10	9
Edna G.....	67	18	1
Edith G.....	11	2	1
Eleanor.....	36	11	9
Elizabeth and Ruth.....	38	5	1
Elizabeth N.....	102	23	4
Elizabeth W. Nunan.....	48	17	11
Eliza L. Spurling.....	49	16	1
Elk.....	66	23	7
Ellen and Mary.....	97	23	2
Ellen T. Marshall.....	75	19	2
Elmer E. Gray.....	71	23	8
Elsie.....	98	21	4
Elsie G. Silva.....	50	20	7
Esperanto.....	91	22	3
Ethel B. Penny.....	56	16	4
Fannie Belle.....	16	7	10
Fannie Belle Atwood.....	81	20	5
Fannie E. Prescott.....	74	21	2
Fish Hawk.....	150	31	2
Flora L. Oliver.....	59	19	7
Florence.....	134	18	1
Fox.....	8	6	3
Frances S. Grueby.....	95	25	3
Genesta.....	53	19	3
Gertrude.....	61	19	1
Gertrude de Costa.....	61	19	2
Gladiator.....	75	7	1
Gladys and Nellie.....	52	18	3
Gleaner.....	23	9	7
Gloucester (trawler).....	250	31	5
Good Luck.....	55	19	11
Harmony.....	66	19	4
Harvard.....	72	19	3
Hazel R. Hines.....	79	21	13
Helena.....	40	17	2
Helen E. Murley.....	5	5	7
Henrietta.....	62	19	4
Henry L. Marshall.....	42	15	1
Herbert Parker.....	78	23	5
Hesperus.....	79	25	6
Hilda Silva.....	77	19	3
Hortense.....	43	19	2
Imperator.....	79	25	2
Ingomar.....	85	23	14

SESSIONAL PAPER No. 40

Name of Vessel.	Tonnage.	Number of Men in Crew.	Number of Times Entered.
James and Esther.....	47	14	4
James W. Parker.....	96	23	5
James and Arthur.....	47	17	1
Jeanetta.....	66	19	3
Joffre.....	80	25	3
John D.....	12	5	5
John J. Fallon.....	60	21	5
Judique.....	89	19	3
Killarney.....	73	25	11
Kineo.....	71	19	3
Laverna.....	96	24	10
Leonora Silvieira.....	51	21	5
Little Elsie.....	11	7	4
Lois H. Corkum.....	34	12	2
Louisa R. Sylvia.....	92	25	5
Louise Howard.....	116	10	1
Lucia.....	43	18	3
Mabel E. Bryson.....	23	7	4
Margaret.....	72	18	2
Margaret E. Haskins.....	70	18	2
Margie E. Turner.....	40	14	4
Marjorie Turner.....	41	14	3
Marion McLoon.....	11	8	4
Marshal Foch.....	64	25	2
Mary.....	93	24	1
Mary de Costa.....	62	17	9
Mary E. Harty.....	77	19	2
Mary F. Curtis.....	65	19	12
Matthew S. Greer.....	66	19	3
Mildred Robertson.....	75	18	3
Minerva.....	13	4	5
Monarch.....	83	19	7
Morning Star.....	85	24	3
Motor.....	17	8	5
Mystery.....	65	19	4
Natalie Hammond.....	67	21	4
Norma.....	65	23	5
Nyoda.....	28	11	2
Ralph Brown.....	67	19	2
Rattler.....	35	8	1
Reading.....	92	23	5
Rebecca.....	49	19	3
Regina.....	111	22	4
Republic.....	48	19	3
Restless.....	35	8	3
Rex.....	75	23	5
Richard J. Nunan.....	55	16	12
Robert and Arthur.....	67	19	10
Romance.....	96	23	6
Rose Standish.....	25	8	5
Rhodora.....	70	19	1
Russel.....	67	19	5
Ruth.....	49	17	3
Ruth and Margaret.....	97	25	4
Sadie M. Nunan.....	36	16	10
Saladin.....	89	19	3
Sea Bird.....	169	31	6
Senator.....	74	8	1
Sibyl.....	18	7	2
Silvieira.....	51	19	1
Squanto.....	81	23	17
Somerville.....	82	22	3
Stiletto.....	136	19	4
Sunapee.....	18	8	5
Teazer.....	59	19	5
Thelma.....	28	12	2
T. M. Nicholson.....	90	23	3
Valentina.....	28	12	16
Victor.....	75	20	2
Vida McKeown.....	83	20	2
Viking.....	34	16	1
Waltham.....	47	17	2
Waldo L. Stream.....	85	21	1
William H. Ryder.....	45	18	2
Totals, Atlantic.....	9,815	2,588	622

11 GEORGE V, A. 1921

List of United States Fishing Vessels which entered Canadian Ports on the Pacific Coast during the year ended December 31, 1919.

Name of Vessel.	Tonnage.	Number of Men in Crew.	Number of Times Entered.
Active.....	25	6	1
Adelphi.....	21	3	15
Adeline.....	6	4	2
Agnes.....	17	5	3
Alameda.....	4	4	10
Alaska.....	44	15	10
Albatross.....	40	13	14
Albatross.....	16	5	24
Alfred.....	13	3	3
Alice B.....	13	5	4
Almara.....	49	6	1
Alpha.....	12	5	4
Alten.....	43	15	11
Alvilda.....	18	13	4
America.....	25	5	3
Anna J.....	22	5	5
Anna J. Larsen.....	25	11	5
Annie.....	11	4	2
Apache.....	77	5	3
Arctic.....	29	11	2
Atlantic.....	25	11	5
Atlas.....	31	11	7
August.....	19	4	2
Augusta.....	19	5	3
Aurora.....	13	5	2
Baldy.....	7	3	10
Baltic.....	24	5	2
Bartalome.....	4	3	10
Bear.....	31	5	1
Beaver.....	17	5	5
Behring Sea.....	44	5	12
Blue Sea.....	23	8	20
Bravo.....	4	3	13
Bring Gold.....	12	5	11
Brothers.....	13	5	9
Cape Spencer.....	11	5	4
Carlisle.....	10	2	1
Cascade.....	14	2	16
Cedric.....	7	3	1
Celtic.....	4	2	1
Charlotte B.....	15	3	1
Chimera.....	9	4	4
City of Blaine.....	26	4	1
Clara.....	6	5	19
Cleopatra.....	33	5	8
Coaster.....	10	2	1
Commonwealth.....	60	16	3
Companion.....	10	3	2
Constance.....	53	15	3
Constitution.....	39	13	10
Convention.....	20	5	15
Cora.....	4	3	8
Corona.....	19	11	9
Crescent.....	14	5	4
Daisy.....	18	8	7
Deep Sea.....	35	5	4
Delphinium.....	20	5	4
Democrat.....	27	6	8
Dick.....	10	4	3
Dip.....	4	3	14
Director.....	12	4	13
Dolphin.....	7	4	13
Dorothy Hulbert.....	20	8	12
Eagle.....	15	6	7
Eastern Point.....	4	3	15
Eclipse.....	24	6	5
Eidsvold.....	15	5	14
Einer Beyer.....	92	6	3

SESSIONAL PAPER No. 40

Name of Vessel.	Tonnage.	Number of Men in Crew.	Number of Times entered.
Eleanora.....	16	5	1
Elfin.....	4	2	3
Emblem.....	4	3	5
E. Neilson.....	15	3	4
Ethelyn.....	4	2	5
Eureka.....	4	2	2
Evolution.....	17	5	7
F. C. Hergert.....	15	5	1
Fenwick.....	27	4	1
Fisher.....	14	6	15
Flamingo.....	13	5	3
Flattery.....	10	3	8
Flivver.....	3	2	3
Fortuna.....	21	5	5
Forward.....	18	5	2
Fram.....	4	3	4
Frances E.....	58	5	6
Freedom.....	28	5	4
George Washington.....	13	2	6
Gilford.....	12	4	1
Gjoa.....	13	5	10
Glacier.....	10	5	4
Golden Gate.....	23	4	2
Goney.....	12	5	7
Grace J.....	3	2	1
Gradac.....	22	7	1
Grayling.....	16	5	15
H. & R.....	4	3	23
Hanna.....	11	5	2
Happy.....	17	4	2
Harder.....	8	3	1
Harvester.....	15	5	3
Hattery.....	10	4	1
Helena.....	18	5	14
Helen D.....	8	5	1
Helgeland.....	56	15	6
Hellenic.....	24	6	2
Hergert.....	15	5	10
Hilda.....	10	3	12
Hillside II.....	28	4	4
Holdal II.....	4	3	10
Home.....	9	3	1
Hulda.....	6	3	1
Husky.....	19	2	3
Ida.....	7	2	2
Imperial.....	23	8	10
Jean.....	9	2	2
Jeannie.....	14	4	1
Jennie.....	14	4	1
Jennie F. Decker.....	16	8	9
Jessie Island.....	19	3	1
Johanna.....	23	5	3
J. P. Todd II.....	12	4	3
June.....	15	5	4
King and Wing.....	97	22	6
Kingfisher.....	14	4	2
Kingsmill.....	38	5	3
Klatawa.....	15	3	2
Kodiak.....	38	13	16
Lansing.....	16	5	10
La Paloma.....	14	11	12
Lebanon.....	14	5	14
Lenore.....	14	4	6
Liberty.....	44	15	18
Lincoln.....	17	4	11
Lister.....	14	5	1
Livingston.....	24	6	8
Louise.....	16	6	7
Lovera.....	4	4	1
Lumen.....	10	4	10
Lummi No. 2.....	38	5	4

11 GEORGE V, A. 1920

Name of Vessel.	Tonnage.	Number of Men in Crew.	Number of Times entered.
Mabel A.....	22	5	5
Madeline J.....	21	5	4
Magdalene.....	27	4	2
Maghuel.....	6	3	15
Malolo.....	9	11	11
Margaret J.....	10	4	4
Mars.....	14	4	1
Mary.....	16	8	14
Mildred.....	19	8	9
Missawit.....	36	2	1
Miyako.....	18	3	2
Morengen.....	17	5	1
Morzhovia.....	62	6	4
Myrtle.....	9	4	13
Navigator.....	13	4	8
Nellie.....	4	3	1
New England.....	70	32	4
Newcastle No. 6.....	64	5	2
Niagara.....	13	4	14
Nidaros.....	13	5	17
Nomad.....	15	5	4
Nora.....	16	2	2
Norland.....	19	5	3
Norma.....	6	3	14
North.....	9	3	11
North Cape II.....	4	3	10
North Star.....	12	5	8
North Western.....	19	5	1
Olympic.....	30	11	15
Omaney.....	34	14	8
Onah.....	18	5	13
Orient.....	48	13	9
Pacific.....	26	11	6
Panama.....	24	13	19
Panther.....	30	4	2
Pauline.....	14	5	5
Pershing.....	18	5	7
Petrel.....	4	3	1
Pioneer.....	48	15	11
Pioneer III.....	26	5	2
Polaris.....	45	15	10
Presho.....	14	5	9
President II.....	23	3	2
Progress.....	6	2	7
Rainier.....	4	3	9
Republic.....	51	15	11
Reliance.....	14	4	13
Restitution.....	24	5	8
Roald Amundsen.....	16	4	1
Rolf.....	6	3	1
Rolfe.....	10	5	3
Roosevelt.....	13	5	4
Rosario.....	16	5	11
Royal.....	15	4	1
Rush.....	254	14	4
S. & S.....	4	3	11
Sadie K.....	13	5	7
Sammy.....	8	3	3
San Francisco.....	33	2	1
Sarah.....	9	2	1
Saturn.....	4	3	5
Scandia.....	79	17	7
Scout.....	5	2	1
Seattle.....	55	15	17
Senator.....	11	11	10
Seymour.....	44	14	10
Shamrock.....	21	4	4
Signal.....	13	4	2
Siloam.....	16	5	15
Sitka.....	50	16	7
Speculator.....	9	4	23
Spencer.....	17	5	3

SESSIONAL PAPER No. 40

Name of Vessel.	Tonnage.	Number of Men In Crew.	Number of Times Entered.
Stamsund.....	14	3	1
Standard.....	10	2	1
Star.....	12	3	8
Stranger.....	6	3	1
Success.....	4	4	2
Sumner.....	34	8	5
Sunrise.....	24	2	1
Sunset.....	24	4	2
Sunwing.....	15	5	3
Superior.....	16	5	4
Swiftsure.....	22	5	14
Taboo.....	16	3	1
Tahoma.....	18	10	14
Tatoosh.....	24	5	13
Texas.....	16	5	6
Thelma.....	4	3	2
Tillicum.....	21	5	12
Titanic.....	9	4	1
Tom and Al.....	57	15	13
Tordenskjold.....	39	13	14
Totem.....	8	2	1
Treo.....	28	5	1
Trio.....	19	8	3
Tyee.....	89	20	10
Tyu.....	12	4	1
Tzartoos.....	22	6	6
U. & J.....	19	3	2
Una Mae.....	26	2	1
Uranus.....	15	5	4
Valid.....	8	3	5
Vansee.....	43	15	11
Venus.....	3	3	14
Venus.....	25	6	2
Vesta.....	13	5	12
Vienna.....	17	5	17
Viking.....	10	4	18
Vivian.....	9	3	2
Volunteer.....	21	5	19
Voyageur.....	3	3	1
Washington.....	24	11	9
Wee Wee.....	4	2	1
West Coast.....	22	5	6
Westfjord.....	17	6	5
White Star.....	17	4	7
Wilhelmina.....	17	5	4
Wilson.....	19	5	7
Wireless.....	17	5	7
Woodrow.....	23	5	5
Yakutat.....	41	15	10
Yellowstone.....	22	5	9
Zilla May.....	56	13	11
Totals, Pacific.....	5,552	1,523	1,700

APPENDIX 4.

FISHERIES EXPENDITURE, 1919-20.

	Appropriation.	Expenditure.
	\$ cts.	\$ cts.
Salaries and disbursements, F.O.....	\$294,492 22	
Fisheries Patrol Service.....	291,246 27	
Oyster Culture.....	6,065 62	
Fish Breeding.....	365,000 00	305,476 75
Deep Sea Fisheries and transportation fresh fish.....	100,000 00	79,581 75
Building Fishways.....	30,000 00	29,831 72
Legal and Incidental Expenses.....	4,000 00	1,840 76
Fisheries Intelligence Bureau.....	5,000 00	1,614 85
Inspection of pickled fish.....	15,000 00	7,238 28
Marine Biological Board.....	26,000 00	26,000 00
Scientific investigation into fisheries.....	10,000 00	
Compassionate Allowance to Mrs L. F. Ogilvie.....	1,000 00	1,000 00
Totals.....	1,156,000 00	1,044,388 22
Fishing Bounty.....	160,000 00	155,136 70
Paid out of Consolidated Revenue Fund.....		16,556 93

Provinces.	Salaries and disbursements of F.O.	Fish Breeding.	Fisheries Patrol Service.	Building Fishways and Clearing Rivers.	Inspecting Canned and Pickled Fish.
	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
Nova Scotia.....	64,897 03	16,243 01	31,014 36	1,727 65	2,748 80
P.E. Island.....	11,236 85	2,918 40	4,346 23		
New Brunswick.....	53,756 11	34,275 01	17,470 80		2,760 62
Quebec.....	8,405 17	13,125 26	33,679 99		
Ontario.....		75,479 78	188 83		247 00
Manitoba.....	8,615 30	26,379 94	21,176 75		
Alberta.....	18,994 11	7,203 06			
Saskatchewan.....	15,633 19	4,147 16			
British Columbia.....	92,073 18	111,918 01	167,180 77	27,981 59	992 55
Yukon.....	11 65				
General Account.....	20,869 63	13,787 12	16,188 54	122 48	489 31
Totals.....	294,492 22	305,476 75	291,246 27	29,831 72	7,238 28

FISHERIES REVENUE, 1919-20.

Provinces.	Amount Collected.	Refunds.	Net Amount.
	\$ cts.	\$ cts.	\$ cts.
Ontario.....	1,421 80		1,421 80
Quebec.....	8,085 78		8,085 78
New Brunswick.....	16,461 02	20 00	16,441 02
Nova Scotia.....	10,220 28	7 00	10,213 28
Prince Edward Island.....	4,781 68	40 00	4,741 68
Manitoba.....	12,154 17	15 00	12,139 17
Saskatchewan.....	4,336 00	15 00	4,321 00
Alberta.....	8,318 85	5 00	8,313 85
British Columbia.....	270,899 41	201 00	270,698 41
Yukon.....	215 00		215 00
Total.....	336,893 99	303 00	336,590 99

SESSIONAL PAPER No. 40

APPENDIX 5.

The following is a statement showing the number of licenses of the different kinds, issued in *each Province* during the 1919-20 Season:—

QUEBEC.

Kind of License—	No. Issued.
Lobster Packing.....	53
Lobster Extensions, 19.....	
Lobster Fishermen's.....	568 (6 cancelled)
Fish Cannery.....	3
Salmon Fishery.....	159 (4 cancelled, 1 free)
Herring Trap Net.....	46 (1 cancelled)
Cod Trap Net.....	274 (6 cancelled)
Rental of Salmon Fishing Privileges in the estuary of St. John River,	1
	<hr/> 1,103

PRINCE EDWARD ISLAND.

Lobster Packing.....	191
Lobster Extensions, 92.....	
Quahaug Fishery.....	14
Fish Cannery.....	10
Lobster Fishermen's.....	1,903
Smelt Gill Net.....	171
Smelt Bag Net.....	244 (2 cancelled)
Oyster Fishery.....	196
Trap Net.....	7
	<hr/> 2,736

NOVA SCOTIA.

Lobster Packing.....	152 (1 cancelled)
Lobster Extensions, 112.....	
Special Angling Permits.....	264 (4 free)
Fish Cannery.....	25
Lobster Fishermen's.....	8,164 (1 cancelled)
Smelt Gill Net.....	259
Smelt Bag Net.....	175 (1 cancelled)
Oyster Fishery.....	150
Trap Net.....	233 (2 cancelled)
Salmon Net.....	21
Drag Seine.....	141 (1 cancelled)
Herring Weir.....	103
Trap Net Extensions, 1	
Scallop Fishery.....	257
Lobster Pound.....	8
Lobster Pound Certificates, 192.....	
	<hr/> 9,952

NEW BRUNSWICK.

Lobster Packing.....	163
Lobster Extensions, 29.....	
Fish Cannery.....	8
Lobster Fishermen's.....	1,938
Scallop Fishery.....	2
Clam Permits.....	5
Herring Weir.....	803
Bass Gill Net.....	53
Quahaug Fishery.....	96
Salmon Fishery.....	523
Smelt Gill Net.....	110
Smelt Bag Net.....	2,479 (24 free).
Oyster Fishery.....	332
Bass Fishery.....	29 (6 free)
Sturgeon Fishery.....	3
Salmon Net Permits.....	91
Whitefish Fishery.....	5
Lobster Pound Licenses.....	3
Lease of Dark Harbour..1.....	
	<hr/> 6,643

11 GEORGE V, A. 1920

MANITOBA.

Special Fishery.....	1,951 (4 cancelled)
Settler's Permits.....	299 (1 cancelled)
Commercial Sturgeon.....	87
Domestic Sturgeon.....	Nil.
Receipts, 811.....	
	<hr/> 2,337

SASKATCHEWAN.

Fish Cannery.....	Nil
Commercial and Fishermen's.....	672 (4 cancelled)
Domestic.....	179 (18 cancelled, 1 free)
Indian and Half-breed.....	673
Commercial Sturgeon.....	16
Domestic Sturgeon.....	9
Angling Permits.....	9
	<hr/> 1,558

ALBERTA.

Angling Permits.....	4,745 (2 cancelled, 6 free)
Commercial and Fishermen's.....	676 (3 cancelled)
Domestic Fishery.....	194 (19 cancelled)
Indian and Half-breed Permits.....	313
Commerical Sturgeon.....	Nil
Domestic Sturgeon.....	Nil
Receipts, 1,700.....	
	<hr/> 5,928

BRITISH COLUMBIA.

Special Angling Permits.....	68
Abalone Fishery.....	Nil
Fish Cannery.....	17
Indian Permits.....	193
Gill-Net, Drift-Net or Drag Seine Licenses operated in conjunction with power boats.....	367
Smelt or Sardine.....	84 (3 cancelled)
Crab Fishery.....	107
Salmon Cannery.....	82
Salmon Trap Net.....	21 (1 cancelled)
Salmon Purse Seine.....	141 (2 cancelled)
Com. Fishery for Salmon Trolling.....	2,260
Salmon Drag Seine.....	104 (2 cancelled)
Sturgeon Fishery.....	1
Herring or Pilchard, Gill-net or Drift-net.....	67
Herring Drag Seine.....	3
Herring Purse Seine.....	53
Salmon Gill-net or Drift-net.....	4,613 (18 cancelled)
Reduction Works Licenses.....	12
Herring Drag Seine or Purse Seine for Halibut fishing vessels.....	Nil
Boat Licenses to buy fresh salmon from fishermen.....	205
B.C. Licenses to persons engaged in cold storage or fish packing to buy fresh fish from fishermen,	162 (8 cancelled)
Whale Factory.....	3
	<hr/> 8,563

YUKON TERRITORY.

Yukon Special Fishery.....	16
	<hr/> 16

Total Number of Licenses issued..... 38,836

SESSIONAL PAPER No. 40

The following is a statement showing the number of prosecutions, confiscations and sales which took place in each province, during the 1919-20 season.

Province of	No. Prosecutions.	Revenue Received.	No. Confiscations.	Revenue from Sales.
		\$ cts.		\$ cts.
Quebec.....	14	590 00	5	117 00
Prince Edward Island.....	52	1,423 00	17	607 57
Nova Scotia—				
District 1.....	1	20 00	8	5 50
District 2.....	27	323 00	22	111 10
District 3.....	11	93 50	10	34 75
New Brunswick—				
District 1.....	30	355 00	49	62 00
District 2.....	25	505 00	58	685 81
District 3.....	40	380 00	26	141 50
Manitoba—				
District 1.....	1	40 00	3	432 00
District 2.....	8	270 00	7	403 17
Saskatchewan.....	20	180 50	16	135 00
Alberta.....	27	112 50	11	128 00
British Columbia—				
District 1.....	72	862 50	23	3,122 31
District 2.....	42	1,060 00	26	3,405 50
District 3.....	20	545 00	22	356 40
Yukon Territory.....	Nil.	Nil.	Nil.	Nil.
Ontario.....	1	10	1	353 90
Total.....	391	6,770 00	304	10,101 51

